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ABSTRACT

Selected articles on various aspects of biology teaching published in 1980 have been annotated in this two-part bibliography. Entries from 19 journals representing 11 different countries are presented according to a topic area classification scheme listed in the table of contents. Countries represented include: Australia; Bulgaria; Czechoslovakia; Federal Republic of Germany; France; German Democratic Republic; Great Britain; Hungary; Poland; Soviet Union; and the United States. The 15 general topic areas include: didactics of biology as a scientific discipline; history of biology; biology instruction abroad; teaching/educational objectives; biology teaching at general education schools; gnoseological, psychological, and logical foundations of biology teaching; biological notions; biology curriculum and content; didactical principles in biology teaching; methods used in biology teaching; biology instruction media; organizational forms of biology instruction; planning; achievement; biology teachers; and articles and information related to scientific biology. Each entry (numbered according to a code in the table of contents) includes author, original title (and English translation when appropriate), complete journal reference, and English abstract. Entries do not necessarily reflect all the topic and sub-topic areas included in the table of contents. (JN)

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INFORMATION BULLETIN

DIDACTICS OF BIOLOGY

Selective Bibliography 1981

part I

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Table of Contents Page

List of excerpted journals 12

Authors of annotations 13

Bibliographic summary sheet and classification of entries

1. The didactics of biology as a scientific discipline

1.1 The subject-matter of the didactics of biology

1.2 Definitions and objectives

1.3 The significance of didactics for practical biology instruction

1.4 Relation to other sciences and place in system of sciences

1.5 Basic terms and scientific terminology 14

1.6 Scientific methods, main sources and organisation of scientific research

1.7 Principle differences existing in biology instruction and the didactics of biology in capitalist and socialist societies

1.8 Periodicals on the didactics of biology 14

1.9 Textbooks and printed lectures on the didactics of biology

2. The history of biology teaching and the didactics of biology 16

2.1 The history of biology teaching and the didactics of biology in Czechoslovakia

2.2 The history of biology teaching and the didactics of biology in Tsarist Russia and the USSR

2.3 The history of biology teaching and the didactics of biology in the other socialist countries

2.4 The history of biology teaching and the didactics of biology in the foremost capitalist countries

Page

3. Contemporary biology teaching and the didactics of biology abroad 13

3.1 Contemporary biology teaching and the didactics of biology in the socialist countries 19

3.2 Contemporary biology teaching and the didactics of biology in the foremost capitalist countries 27

4. Educational and teaching objectives and the tasks of biology instruction 33

5. Biology teaching as a component of instruction at general education schools 34

5.1 Relations between biology as a science and biology instruction at general education schools

5.2 Specific aspects of biology instruction at general education schools

5.3 Specific aspects of biology instruction at specialized vocational schools

5.4 Principles for adjusting biology instruction to general education schools

5.5 The position of biology in the curriculum of general education schools

5.6 Special aspects of biology instruction at various levels of general education schools

5.7 Mutual relations between biology instruction at various levels of general education schools

5.8 The educational and teaching significance of instruction in various biological fields, mutual relations between various biological fields, determining the sequence of individual biological fields of study

5.9 Elective biology instruction in general education schools 35

6. The educational and teaching process of biology instruction and its gnoseological, psychological and logical foundations 37

6.1 The forming of biological notions 38

6.2 Acquainting pupils with biological laws

6.3 Acquainting pupils with the use of biological knowledge in practice Page
6.4 Teaching pupils basic scientific methods used in biology and acquainting them with school biology technical media
6.5 The forming of habits and skills
6.61 The forming of hygienic habits
6.6 The use of learnt knowledge, skills and habits in practice
6.61 Combining biology teaching and socially beneficial work
6.7 Guiding pupils towards successful learning in biology. The activation of pupils. Self-control 42
6.71 Examening the causes of failure in pupils in biology and methods for overcoming these causes
6.72 The education of logical thinking in biology instruction, logical procedures 48
6.73 Developing language skills in biology instruction 53
6.74 Logical models in biology instruction, cybernetic models in biology instruction 53
6.8 Scientific education in biology instruction 55
6.81 The forming of a scientific worldview in biology instruction 56
6.82 Atheistic education in biology instruction 59
6.83 Education towards socialist patriotism and proletarian internationalism in biology instruction 60
6.84 Work education in biology instruction 61
6.85 Polytechnical education in biology instruction
6.86 Aesthetical education in biology instruction 62
6.87 Education towards nature conservation and environmental conservation in biology instruction 63
6.88 Health-care education in biology instruction 93
6.89 Sex education in biology instruction 104

Page

6.90 Educational and vocational guidance in biology instruction 109

6.91 Education towards parenthood in biology instruction 110

6.92 Education towards team work in biology instruction

6.93 Education towards defence training in biology instruction 111

7. The content of biology instruction

7.1 The principles for selecting teaching subject-matter, methods of this selection and the organisation of teaching subject-matter

7.11 The integration of biology and other natural science subjects

7.12 Instruction on the basis of examples and categories

7.13 Problem teaching 112

7.14 Team teaching

7.2 Selecting guiding principles of biology instruction and differentiating substantial and insubstantial teaching subject-matter, other problems connected with basic teaching subject-matter

7.3 Dividing teaching subject-matter into various classes. The principles of ordering the subject-matter into a didactical system

7.4 Linear and concentrical ordering of teaching subject-matter

7.5 Dividing the subject-matter into chapters, topics and partial topics

7.6 Biology curricula and teaching syllabi 116

7.7 The study of existing curricula and teaching syllabi for biology instruction

7.8 The comparative study of curricula in the socialist countries and the foremost capitalist countries, positive and negative aspects of these curricula

7.9 Endeavours for modernisation in biology instruction 128

Page

7.91 Teaching strategies

8. Didactical principles in biology instruction

8.1 The didactical principle of a scientific approach

8.2 The didactical principle of combining school work with every-day life. The regional and current principles 130

8.3 The didactical principle of educational instruction

8.4 The didactical principle of consistency and sequence teaching

8.5 The didactical principle of ostensiveness or unity of the specific and abstract 132

8.6 The didactical principle of combining theory and practice 133

8.61 The didactical principle of comprehensibility

8.62 The didactical principle of awareness of the knowledge learnt

8.63 The didactical principle of the permanency of the knowledge learnt

8.7 The didactical principle of taking into account the individuality of each pupil

8.8 The didactical principle of taking into account interdisciplinary relations 134

8.9 The didactical principle of hygienic and safe biology instruction 141

9. Methods of biology instruction

9.1 The dependency of methods used in instruction on the scientific methods used in biology

9.2 Classification of methods used in biology instruction

9.3 Principles for selecting an instruction method and its correct use

9.4 The method of continuous exposition

9.5 Interview method 145

Page

9.6 Method of work with literature (textbook, syllabus, workbook, worksheet, atlas, key for determining flora and fauna) 147

9.7 Method of observation 150

9.8 Experimental method 169

10. Biology instruction media 207

10.1 Individual types of media, their importance 208

10.11 Studying the didactical value of media used in biology instruction 209

10.12 Principles for providing schools with media for biology instruction

10.2 Original live objects 211

10.21 Original objects in the environment

10.22 Original objects in an artificial environment

10.23 Living nature rooms or corners in schools

10.24 Aquariums, micro-aquariums, terrariums, aqua-terrariums

10.25 Insectariums

10.26 Breeding animals in schools, breeding facilities, the collection of animals. Calanders for collecting fauna 213

10.261 Zoological gardens

10.27 Cultivating plants, hydroponics 217

10.271 A school plot of land, botanical gardens, young natural scientist stations, school biology centres 219

10.272 Exhibitions 224

10.273 Museums 225

10.3 Mounted and preserved original objects

10.31 Dismantled plants

10.32 Dry specimens of plants with shape intact

10.33 Herbariums

Page

10.34 Collections of seeds, cross-sections of woody species, branches with buds, samples of plant disease

10.35 Plant specimens mounted in fluids

10.41 Dismantled animals

10.42 Dissections of animals

10.43 Skin samples, taxidermal specimens

10.44 Specimens embedded in resins

10.45 Entomological specimens

10.46 Osteological specimens, specimend of skin derivatives

10.47 Specimens of bird eggs and nests, bird feathers and pellets

10.48 Specimens of mollusc shells and conches

10.49 Animals mounted in fluids

10.51 Microscopy specimens of plants

10.52 Microscopy specimens of animals and those pertaining to the biology of man 228

10.53 Palaeontological plant material

10.54 Palaeontological animal material

10.6 Three-dimensional representation media

10.61 Models 229

10.62 Imprints and casts

10.7 Two-dimensional representative media

10.71 Films (school films, popular science films, film cassettes, etc.) 236

10.72 Television and radio in school 241

10.73 Pictures 244

10.731 Pictures attached to flannel sheets

10.732 Pictures attached to magnetic boards 248

10.733 Foils and transparencies 250

10.74 Photographs, macro-photographs, micro-photographs 251

10.75 Slides and slide series 253

10.76 Sketches, floral diagrams and formula 254

Page

10.77 Tape-recordings of animal voices, animal voices on phonograph records

10.78 Postage stamps with biological subject-matter

10.79 Rubber stamps, prints, photograms 256

10.80 Statistical tables, graphs, diagrams

10.81 Maps

10.82 School bulletin boards, clippings from the press and periodicals

10.83 Textbooks, methodological handbooks 257

10.84 Teaching syllabi

10.85 Worksheets, workbooks, didactical tests, questionnairs, didactical cross-word puzzles, etc., didactical games 263

10.86 Atlases and Keys to natural objects 266

10.87 Basic scientific literature, literature concerning the didactics of biology 269

10.88 Popular science literature and periodicals 270

10.89 Pupils' notes 271

10.9 Instruments and devices for biology instruction 271

10.91 Instruments for cultivating micro--organism cultures

10.92 Instruments and aids for experiments with natural objects 272

10.93 Chemicals and indicators for experiments with natural objects

10.94 Measurement instruments 274

10.95 Instruments for making images and reproducing sound, film projectors, episcopes, epidiascopes, slide projects, overhead projectors, tape recorders and decks, radio sets, phonographs, radio--phonographs 275

10.96 Optical instruments, magnifying glasses, mounting magnifiers, microscopes, exposure meters, cameras 276

Page

10.97 Areas devoted to instruction and to the storage of aids - biology workrooms, biology laboratories, biology storage rooms 277

10.98 Mini-calculators in biology instruction

11. Organizational forms of biology instruction

11.1 Surveys of organizational forms, classification of organizational forms

11.2 Teaching lessons

11.21 Laboratory work 278

11.22 Practical excercises in biology 282

11.23 Hobby clubs 287

11.24 Biology discussions

11.25 Group teaching 294

11.26 Work in a living-nature room or corner

11.27 Activities in groups to catch up with the class

11.28 Work on experimental school plots of land

11.29 Individual consultations and tutorials

11.31 Film afternoons

11.32 Excursions, hiking camps 295

11.33 Socially beneficial work 308

11.4 Biology Olympiads, biological competitions

11.5 Publication of a school magazine, bulletin board, work on school albums

11.6 Individual homework

11.7 Work in a biology hobby club

11.8 Field work and summer natural science activities, scientific trails 313

11.9 Television and radio universities

12. Planning biology instruction 314

12.1 Instructions for drawing up plans for biology instruction and individual topics

12.2 Training teachers for instruction, for teaching lessons and other organizational form of biology instruction 317

Page

12.21 Preparations for botany instruction 327

12.22 Preparations for zoology instruction 344

12.23 Preparations for instruction in the biology of man 359

12.24 Preparations for instruction in general biology 375

13. The outcome of biology instruction 386

13.1 Verification of results achieved in biology instruction, repetitions, strengthening, systemisation and structuralisation of subject-matter, surveys of subject-matter 387

13.2 Assessment of results achieved in biology instruction 389

13.3 School-leaving examinations in biology 390

13.4 Outcome of biological competitions 392

13.5 Examinations in biology

14. The biology teacher 393

14.1 Demands made of a biology teacher

14.2 Teacher training in normal, inservice and post-graduate study courses at pedagogical and natural science faculties 396

14.3 Public activities undertaken by teachers, work in distruct pedagogical societies, in regional pedagogical societies, biology supervisors, visits to class by supervisors 398

14.4 Doctoral work in the didactics of biology

14.5 Self-education of biology teachers

14.6 Pedagogical readings

14.7 Meetings, conferences congresses concerning biology

14.8 Vocational guidance and the biology teacher

14.9 Outstanding biology teachers, anniversaries, deaths 407

Page

15. Articles with information concerning scientific biology 409

15.1 Botany 437

15.2 Zoology 445

15.3 Biology of man 459

15.4 General biology, genetics, macro-molecular biology 468

15.5 Medicine, health-care 477

15.6 Agriculture and crop engineering 485

15.7 Agriculture and zoo-technological engineering 488

15.8 Outstanding scientists, anniversaries, deaths 489

15.9 Scientific institutes 491

16. Scientific articles concerning nature conservation and environmental conservation

17. Scientific articles concerning geology, mineralogy, petrography and pedology

17.1 Scientific articles on other natural sciences and mathematics

Index of authors with numbers of their entries 494

List of Excerpted Journals

A biologia tanétas, 20, 1981, Nos. 1-6	Hungary
Biologia i khimiya, 24, 1981, Nos. 1-6	Bulgaria
Biologia w szkole, 34, 1981, Nos. 1-5	Poland
Biologie-Géologie, 68, 1981, Nos. 1-4	France
Biologie in der Schule, 30, 1981, Nos. 1-12	G.D.R.
Biologiya v shkole, 55, 1981, Nos. 1-6	USSR
Der Biologieunterricht, 17, 1981, Nos. 1-4	FRG
Der mathematische und naturwissenschaftliche Unterricht, 34, 1981, Nos. 1-2, 4, 6-8	FRG
Journal of Biological Education, 15, 1981, Nos. 1-4	Great Britain
Natural Science in Schools, 19, 1981, Nos. 1-3	Great Britain
Naturwissenschaften im Unterricht-Biologie, 29, 1981, Nos. 1-12	FRG
Praxis der Naturwissenschaften-Biologie, 30, 1981, Nos. 1-12	FRG
Přírodní vědy ve škole, 32, 1981, Nos. 1-10	Czechoslovakia
Science Education, 65, 1981, Nos. 1-5	USA
The American Biology Teacher, 43, 1981, Nos. 1-9	USA
The Science Teacher, 48, 1981, Nos. 1-9	USA
The Australian Science Teachers Journal, 27, 1981, Nos. 1-3	Australia
The School Science Review, 63, 1981, Nos. 1, 2, 4	Great Britain
Učební pomůcky ve škole a osvětě, 20, 1981, Nos. 1-10	Czechoslovakia

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1.5 Basic terms and scientific terminology

1. ALTMANN, A.: Odborná terminologie v učebnici Přírodopis 6 - Zoologie (Specialised terminology in the textbook for the 6th class on zoology) Přírodní vědy ve škole, 32, 1980/1981, No. 6, pp. 208-209.

This new textbook takes fully into account the didactical principle of a scientific approach. Biological terms are precisely formulated on the basis of classical methods, with the aid of the nearest genus and specie difference. The names of species in the textbook are in accord with contemporary and generally accepted standards. New terminology, which concerns above all mammals, is also fully used by the textbook.

1.8 Periodicals on the didactics of biology

2. AWRAMOWA, E.: Bulgarskie czasopismo Biologia i chimija (The Bulgarian journal Biologiya i khimiya) Biologia w szkole, 34, 1981, No. 1, pp. 58-59

Biologiya i khimiya is a methodological journal published by the Bulgarian Ministry of Education together with the Union of Bulgarian Teachers. It is issued every two months, 6 times a year and has been published for 34 years. It deals with current problems of biology and chemistry instruction in Bulgaria. The author, who is a Bulgarian, provides information on the articles published in 1979. The journal has the following regular sections: Science and production; The methodology of teaching and exchange of experiences in this field; Extracurricula activities of pupils;

Experiences and demonstrations; On the history of science and education; Information and new knowledge. The journal is also important from the point of view of ideological education and for improving the qualification of biology and chemistry teachers in Bulgaria.

3. KUMMER, G. - GEMEINHARDT, D.: Zum neuen Jahr
(To the New Year)
Biologie in der Schule, 30, 1981, No. 1, pp. 1-2

This editorial has the form of a New Year's greeting from the editors to readers. The results achieved are briefly described and readers are acquainted with plans for the year 1981. The journal will give priority to articles concerning specific scientific problems, ethical and aesthetical education, improving the quality of instruction and motivation to learning. In the future, stress will also be placed on problems concerning the biology of man, health-care education, ecology and genetics.

4. STAVIŇSKI, W.: Czasopismo "Der Biologie-Unterricht"
(The journal Der Biologie-Unterricht)
Biologia w szkole, 34, 1981, No. 3, pp. 184-185

Der Biologie-Unterricht is a didactical journal which concentrates on instruction in general education schools in the Federal Republic of Germany; it has been published for 16 years, by the Ernst Klett Publishers in Stuttgart. It deals with the methodological aspects of biology teaching at various levels and demonstrates the possibility of utilising modern biology as a science in the teaching process. The problem of transposing university level biology to various types on secondary schools is a frequent topic of disscusion. Every issue is devoted to a special problem; the 1st issue for 1980 is devoted to the biology of membranes, the next issue to teaching biology in the lower classes of secondary school and the utilization of suitable animals in class, etc.

2. The history of biology teaching and the didactics of biology

5. SUCJER, U.: *Kalendarium zum Biologiegeschichte 1981* (A calendar of events significant in the history of biology)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 110-113.

This calendar includes important anniversaries and birthdays of outstanding biologists. Their use in biology instruction serves to improve pupils' understanding of the history of various discoveries. It includes the following anniversaries: the 100th anniversary of the birth of H.Staudinger, the 50th anniversary of the death of S.B. Kitasat, the 75th anniversary of the death of F.R. Schaudinn, the 100th anniversary of the death of M.J. Schleiden, the 150th anniversary of the birth of W. His, the 100th anniversary of the birth of A. Fleming, the 200th anniversary of the birth of J.F. Meckel, the 175th anniversary of the birth of A.P. de Candolle, the 175th anniversary of the death of J.G. Koelreuter. Each of these biologists is briefly described and his contribution to science stressed. 150 years ago E. Souberian discovered chloroform (CH). That same year Darwin sailed on the Beagle. 125 years ago H. Welcker introduced the microtome and J. Fuhlrott discovered his remnants of man. 75 years ago W. Bateson introduced the term "genetics", 50 years ago O. Warburg recieved the Nobel Prize and M. Knoll with E. Rusk built the first electrone microscope.

3. Contemporary biology teaching and the didactics of biology abroad

6. FELS, G.: Zur Situation des Ökologieunterrichtes
(The situation in teaching ecology)
Der Biologieunterricht, 17, 1981, No. 4, pp. 5-26.

Ecology is at present recommended with enthusiasm as a component of biology teaching. However, it is in the same danger as other new fields of study have been in the history of biology teaching and the teaching of other subjects. As a consequence of the importance attached to environmental conservation, ecology is often forced upon schools under political pressure, in spite of the fact that it is still a young and immature science, with many of the symptoms of the "diseases of childhood". Attempts are being made to achieve a maximum in the shortest possible time, but both teachers and pupils are unable to adapt that rapidly. The demands made by ecology in the relevant curricula, syllabi and textbooks are often too high and not in accord with the specific characteristics of young pupils and their education. Eleven-year-old pupils are for instance asked to learn the principle of modern water treatment plants, without understanding basic biological, chemical and physical concepts. The person who suffers most in such situations is the one at the end of such processes - in this case the pupil! Ecology as a science uses a number of notions and terms borrowed from various other natural sciences, such as chemistry, physics and geography. It has already undergone a period of flourishment, but only after World War II did it again become a modern science. Yet until the present it still does not have a precise terminology and definitions of basic terms; this makes the work of teachers in schools more difficult. It remains too theoretical and often offers a number of different theories; it is therefore difficult to make it didactical. In the school curriculum, not only biology should shoulder the whole burden of ecology. So far no unity of opinion exists on how to divide ecology into various grades and were teaching lessons should be allocated to it. Interdisciplinary relations are insufficiently developed. A number of topics tend to be repeated and then are rejected by pupils. Also psychological difficulties tend to arise on the basis of some of the conclusions arrived at by ecology (the Club of Rome conclusions, etc.). There is not enough room in the curriculum for ecology since it is very difficult to decide which subjects should be reduced to make room for it. School ecology cannot have the same structure and content as ecology taught at institutions of higher learning. Sections concerning the population can be taught in secondary school, but not the sections on genetic ecology, phylogenic ecology or energy ecology. Their inclusion would reduce instruction to mere verbalism. Ecological notions should be formed gradually and one founded in another. The majority of ecological notions are special, most of them are of a heuristic nature and cannot be immediately demonstrated in nature; they tend to be scientific constructions, difficult to forecast and often also difficult to understand. They cannot be put into linear series. They tend to be multi-dimensional and conditional. Ecology can be taught in schools only after specific didactical requirements have been fulfilled and after basic knowledge in the other natural sciences has been gained. Hence the other natural sciences must precede ecology in the curriculum. Also ecological knowledge should be distributed into various teaching subjects. Pupils should first learn the letter of the ecological alphabet, then its grammar and only then can instruction fully adequate to modern ecology take place.

3.1 Contemporary biology teaching and the didactics of biology in the socialist countries

7. BOZAROV, V. - KOSTOVA, Z. - GANEV, Z.: Vnedryavane na novoto uchebno sarzhenie i usvrshenstvuvane na uchebno-vzpitatelniya proces po biologiya (Concerning the new content of the teaching syllabus and improvements in the educational and teaching process in biology)
Biologiya i khimiya, 24, 1981, No. 1, pp. 14-21.

A new approach to the content of biology instruction means that biological laws are stressed, as well as theory and the foundations of the science, evolutionary biology, cellular theory, the theory of individual development, man as a specie, the laws of heredity, etc.

The complex nature of this approach is in the fact that the teaching syllabus includes three main groups of biological sciences:

1) the basic group is formed by anatomy, morphology, physiology and genetics;
2) taxonomy, which is represented by botany and zoology;
3) applied biology which includes crop production and animal husbandry, breeding and hygiene. Besides this the teaching syllabus also includes the broadly implemented principle of including ecological aspects of the subject-matter taught. The polytechnical principle is implemented by the significant extension of laboratory work aimed at research methods. In conclusion the authors provide a more detailed analysis of the teaching syllabi for individual classes, in view of the above stated principles.

8. CECHI, D. - ZEBALSKA, E.: Wyniki badań wdrożeniowych programów biologii z hygiene w klasie V. (The findings of a project to assess the introduction of a new biology teaching syllabus concerning hygiene in the 5th class)
Biologia w szkole, 34, 1981, No. 4, pp. 218-224. 8 tabs.

Between the school years 1976-77 and 1979-80 experimental teaching syllabi were verified. The syllabi were written by the staff of the Institute of School Curricula and Syllabi of the Ministry of Education and by the Institute of the Didactics of Biology of the Pedagogical Faculty in Krakow. In the course of the verification, the opinions of both supervisors and teachers were taken into account. 19 different schools in 6 regions participated in the pilot study. They were located in urban, rural and city areas. The functionality of the teaching syllabi, as well as the outcome of tests by pupils were assessed. Interdisciplinary correlations were also studied in analysing the syllabi. Among the research methods used were a theoretical analysis of the syllabi, their structure, methodological observations, experiments with teaching according to the new syllabi, etc. Tables cited in the article provide detailed findings concerning the knowledge of pupils expressed in percentages and assessments of their skills. It was found that the experimental teaching syllabi are difficult, especially for children in rural areas. They are voluminous and especially in some topics should be made shorter. The authors recommend the introduction of worksheets to make more uniform the assessment of pupils´ knowledge and skills. The teaching syllabus should contain only basic subject-matter, which can be learnt by all pupils, so that they are able to follow biology instruction in subsequent classes. Also time should be found for more repetitions. The teaching syllabi should thus have more time reserves.

9. DŁUGOWIEJSKA, J. - ZEBALSKA, E.: *Cele nauczania biologii w klasie V i ich realizacja* (The teaching objectives of biology in the 5th class and their implementation)
Biologia w szkole, 34, 1981, No. 4, p. 200.

In the school year 1976-77 to 1979/80 the new teaching syllabi for biology for the 5th class were verified in a pilot study. Their verification was organized by the Institute for the Didactics of Biology of the Pedagogical Faculty in Krakow, under the leadership of Dr. W. Stanicki and by the Institute of School Curricula and Syllabi, led by Dr. Cicha. The aim of the study was to determine the functionality of the biology teaching syllabus for the 5th class. Thus the purpose of the study was to test the content of the teaching syllabus used in 1976, as well as the methods of work and organizational forms connected with this syllabus. The study indicated the positive and negative aspects of the experimental teaching syllabus and led to several changes in it. The new version of the teaching syllabus published in 1981, includes also mandatory and elective assignments to give to pupils, with special stress on various skills. The educational and teaching objectives of biology in the 5th class are described by the authors. The new syllabus differs to a large extent from the experimental syllabus.

10. GRUNEBERG, U. - NIEDERLAND, D.: Zum Stand und zu einigen ausgewählten Problemen der weiteren Entwicklung des Biologieunterrichts (Concerning the contemporary situation and selected problems of the further development of biology instruction)
Biologie in der Schule, 30, 1981, No. 5, pp. 177-188.

The most important objective of biology instruction is to form in pupils solid knowledge and to develop abilities and skills, as well as a dialectical and materialistic approach to biological phenomena and processes and an understanding of relations existing in nature. An analysis of pupils' knowledge indicates the existence of reserves in dealing with notions and achieving an understanding of relations, as well as in some activities (for instance observations, work with a model, evaluations), which seem to be neglected. Especially the content and scope of notions requires more thorough expositions and frequent repetition. As fas as the activation of pupils is concerned, the authors point out that comparisons, analyses and generalizations require greater attention, as does the development of self-learning abilities, observational skills, the seeking out and solving of problems, work with models, etc. The educational potential of the teaching syllabus should be made greater use of. Stress is placed on worldview education and education towards a love of nature and an understanding of the relations existing between nature and society. In conclusion the authors offer comments on the activities of hobby clubs.

11. MYAGKOVA, A.N. - RUMAYNTSEVA, M.N.: O programme po biologii dlya sredney shkoli na 1981/1982 uchebniy god (Concerning the biology teaching syllabus for secondary schools in the school year 1981/1982) Biologiya v shkole, 55, 1981, No. 1, pp. 23-30.

In the school year 1981/1982 biology will be taught according to an improved version of the teaching syllabus. While the basic structure and content of the old syllabus has been maintained, the new version reflects to a greater extent the foundations of the biological sciences and makes it possible to achieve an integrated biological education, in harmony with the new educational and teaching objectives of the school system and especially of its secondary school component. The improved teaching syllabus also contains, besides the precise content of the biology course, also precisely formulated requirements as far as the knowledge and skills of pupils are concerned, recommendations for marking, as well as a bibliography of recommended methodological literature and basic school furnishings and media.

The changes in the teaching syllabus were introduced with the aim of doing away with overburdening pupils; too complicated sections, which in lower classes required the development of abstract thinking, have been deleted and also sections which assumed the knowledge of chemical and physical laws. The number of anatomical and morphological details has been reduced, as well as the number of cited species, especially those not important from a scientific or practical point of view. Also greater stress has been placed on interdisciplinary relations and repetitions(for instance natural zones were taught both in botany and in geography) have been deleted. The article also cites examples of changes in some botanical and zoological topics and in general biology, as well as the more precise formulations of some topics. More time has also been gained by deleting difficult laboratory excercises, excursions and demontrations.

12. MYAGKOVA, A.N. - RUMYANTSEVA, M.N.: *Vazhniy razdel usovershenstvovannoy programmi* (An important section of the improved teaching syllabus)
Biologiya v shkole, 55, 1981, No. 2, pp. 35-42

The authors stress the importance of the section of the teaching syllabus "Basic requirements of pupil´ knowledge and skills", where those notions and terms, facts, laws and theories which pupils should learn in order to achieve fundamental knowledge of the material nature of the universe, the recognisability of processes occuring in living organisms and the forming of a atheistic dialectical and materialistic worldview are provided. Also knowledge concerning polytechnical education is stressed, as well as the foundations of agriculture theory, conservation theory, and vocational guidance aspects. The article cites some examples from the improved teaching syllabus.

13. Osnovniye trebovaniya k znaniyam i umeniyam uchashchikhsya (Basic requirements concerning the knowledge and skills acquired by pupils)
Biologiya v shkole, 55, 1981, No. 2, pp. 31-34.

This editorial reprints parts of the improved biology teaching syllabus which concern the topic cited in the title. This section of the syllabus specifies the subject-matter for learning and acquiring skills in the following manner:

5th class - botany
6th class - botany (system) + zoology (from protozoa to molluscs)
7th class - zoology (anthropoda, vertebrates)
8th class - human anatomy, physiology and hygiene
9th class - general biology (the evolution of the organic world)
10th class- general biology (the structure and function of the cell, genetics, ecology and nature conservation).

14. PADALKO, N.V.: Priyomi formirovaniya umeniy v kurse botaniki (Methods of forming skills in the botany course)
Biologiya v shkole, 55, 1981, No. 2, pp. 42-47

The skills which pupils should acquire during biology instruction are characterized by the improved biology teaching syllabus in a section called "Basic requirements of pupils' knowledge and skills". In this article the author divides these skills into several groups, from the point of view of speed of learning. He does so the basis of the example of subject-matter taught in the 5th and 6th classes:

1. Making a microscopy specimen and observing it under a microscope.

2. Learning basic plant organs and their parts.
3. Determining plants on the basis of different categories of systematics.
4. Doing simple experiments which clarify life processes taking place in plants and the conditions needed for the life of plants.
5. Observations of seasonal variations taking place in nature.
6. Determining mutual relations in nature, specifically between plants and the environment.
7. The conservation and renewal of plants.
8. Working with the textbook.

15. STAVIŃSKI, W.: Aktualny stan i perspektywy dalszego rozwoju didaktyki biologii (The existing situation and outlooks for the further development of the didactics of biology)
Biologia w szkole, 34, 1981, No. 1, pp. 23-29

The didactics of biology in Poland are considered to be a scientific discipline already for 25 years. Their development took place in the period 1970-1980 when sections on didactics attached to universities were founded in all large Polish cities. This was a reflection of the increased interest in the didactics of biology among teachers. Doctors' degrees in the didactics of biology have been introduced. But the didactics of biology in Poland does not yet have its own journal which would be devoted to scientific problems and to work done in the didactics of biology, as well as to reports of foreign developments in this area. Foreign literature and especially periodicals are difficult to obtain. The didactics of biology is now developing in two directions: one is the traditional and practical trend which is closely connected with school practice, while the other is scientific and attempts to basic theoretical problems concerning the didactics of biology. Textbooks on the didactics of biology should also include the findings of studies and research projects in this field. The author also describes the development of the didactics of biology in Poland and its outstanding representatives. In the future, research methods will have to be improved, as well as their complex nature and interdisciplinary aspects. Also international cooperation and the effectiveness of research programs require improvements. Another task concerns the unification of terminology and making the didactics of biology more specific from the point of view of individual types of schools. Didacticians of biology in Poland have made a significant contribution to the modernization and reorganization of biology instruction in schools (1980) and hence the discipline has very good perspectives for further development.

3.2 Contemporary biology teaching and the didactics of biology in the foremost capitalist countries

16. CIAVATTI, A. - CIAVATTI, G. - CURIEUX, A.L.:
Enseignement de la géologie dans le cycle d'orientation
(Geology teaching in secondary education)
Biologie, géologie, 68, 1981, No. 1, pp. 113-122. 3 figs.

The authors here add a supplement to a circular letter sent by the French Ministry of Public Education concerning geology teaching, containing comments on how to proceed in practical activities in school and outdoors. The study is divided into 4 parts which deal with such problems as what type of landscape to chose for excursions and how to prepare for these excursions, how to put together documentation and pedagogical material such as geological drawings, etc., how to make use of domestic geological sources and foreign ones, especially mineral samples. On the basis of their own experience the authors express the hope that students will have a positive attitude towards geology, which has before it important applications in the future.

17. FRANYO, I. - JÁMBOR, G.: Környezetismeret
(Knowledge of the environment)
A biologia tanítas, 20, 1981, No. 2, pp. 45-51

The new biology curriculum introduced in 1978 will be implemented only gradually. In the sixth class the new teaching syllabus, which is part of the new curriculum, will be introduced in 1983, and the whole course during the next 5 years. Children learn about living nature from the first to eighth classes and biology can be successfully learnt only when preliminary knowledge concerning the properties of living organisms have been learnt. In the first five classes the specific aspects of living organisms are learnt in various subjects and are mutually connected by knowledge concerning the environment. However, it would be incorrect to strive for the introduction of a single teaching subject on the environment which would teach the whole biology course. Nor can environmental problems be reduced only to chemistry, physics, geography or the social sciences. In the authors' opinion biological problems should be divided into five groups: 1) facts about various species, 2) a description of various processes and phenomena, 3) basic terms, 4) mutual influences and links, 5) activities. They deal in detail with each group.

18. RUSSEL, T.Y.: What History of Science, How Much and Why ?
Science Education, 65, 1981, No. 1, pp. 51-64.

The author deals with the question of why the history of science should be taught. In attempting to find an answer, he discusses the role of the natural sciences in the development of mankind, the leading position of the natural sciences in the scientific revolution taking place and its structure. On the basis of various examples he also comments on the problem of how the history of science should be taught, as well as what the role of the teacher should be, the scope of his knowledge and his ability to interpret the history of the natural sciences in a comprehensible, as well as interesting manner which would captivate the imagination of students. In conclusion several recommendations are made concerning further reading on this subject.

19. SCHWARZENBACH, A.M.: Ein modernes Unterrichtskonzept: Biologie-Arbeitsprogramme (A modern concept of teaching: Biology work programmes)
Naturwissenschaften im Unterricht - Biologie, 20, 1981, No. 5, pp. 154-155. 1 fig.

The article provides information on a discussion concerning biology instruction among Swiss teachers. The advantages and shortcomings of the present system are described. Among the factors requiring improvment is the amount of independent work done by pupils in genetics. In situations where the teacher limits his role to only supervising discussions among pupils and correcting false ideas, the work goes ahead very slowly and pupils do not learn. However, when motivation is high, the activities of pupils tend to be more productive. A teacher's exposition does not lead to high pupil activity, but the increment of information acquired is much higher. In the majority of cases actual biology instruction is somewhere between these two extremes. The author recommends the following types of assignments for pupils: independent observations based on instructions; records by pupils of what they have observed, including drawings and interpretations, the assessment of these records among pupils mutually. The aim should be to have pupils work independently with original objects or their adequate substitutes.

20. SCHWARZENBACH, A.M.: Ein neues Arbeitkonzept für den Biologieunterricht (A new concept of work for biology instruction)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 6, pp. 184-185. 1 fig.

The author, who is a Swiss secondary school teacher, here discusses modern concepts of biology instruction where he points to various organizational forms of teaching which have the aim of increasing pupils' activity, as well as the activity of the teacher and the flow of information between them. He assesses various forms from this point of view and stresses their positive and negative aspects.

21. STAECK, L.: Biologieunterricht im Interesse der Schüller (Biology teaching in the interest of pupils)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 5, pp. 143-145.

The author discusses the present state of biology instruction in the schools of the Federal Republic of Germany. At present this instruction can be characterized by the fact that large numbers of natural specimens are described. This is in contrast to modern forms of instruction, which assume a modernization of objectives and stress placed on problems connected with environmental conservation and the every-day life of society. The modern content of teaching stresses the relevancy of practical applications and teaches what is of interest to pupils in the present and for the future. The present concept of biology teaching is to a great extent an anachronism and could under these circumstances end up in the same predicament as Latin in the XXth century. What is permanent in instruction is the endeavour to suitably motivate pupils and make them active. Biology teaching should prepare pupils for life in the present and in the future, prepare them for dealing with various life situations in a way which is adequate to the age of the pupils and adequate to the state of the environment. Problem instruction is very important. The objectives of teaching should be man and his existential problems, the laws of nature, not only from the point of view of their present utilization, but for the future. The subject-matter of biology should be reduced according to these criteria. The author cites an example to make his point: Why are trees in the streets of large cities dying ?

22. YAGER, R.E.: What are "the Basics" in General Biology ?
The American Biology Teacher, 43, 1981, No. 3, pp. 154-156.

Biology should at present serve man as one of the basic pillars of his general education. In view of the enormous scope of biology, the question of the content of general biology remains an open question. The author assesses various suggestions which have been made and he himself suggests a total of 9 topics, which would contain basis biological knowledge. He begins with evolutionary theory and ends with the history of biological notions and terms. The need for teaching this general knowledge, in the author's opinion, lies in the fact that 90 % of all Americans are quite illiterate as far as these problems are concerned.

23. ZÖLLNER, W.W.: Überforderte Biologie (The contemporary approach to biology)
Praxis der Naturwissenschaften - Biologie, 30, 1981,
No. 6, pp. 161-165.

Contemporary biology as a science, as well as a teaching subject, differs greatly from its counterpart in the past. It can be understood only in the context of mathematics, chemistry and physics. Biology itself is becoming an integral part of other sciences, such as psychology. Through biology such modern fields as ethology, cellular neurophysiology, genetics, evolution, ecology and molecular biology are being developed. However, the difference between various approaches to school biology teaching is widening; one group of didacticians demands the teaching of larger numbers of facts, while others demand less knowledge and facts. One of the shortcomings of biology is the insufficient development of interdisciplinary relations and the necessary degree of integration. In a biology course taught in a modern manner, however, biological phenomena cannot be reduced to a mere sum of chemical and physical processes.

4. Education and teaching objectives and the tasks of biology instruction

24. ALTMANN, A.: Výchovně vzdělávací cíle a úkoly výuky zoologie v 6. ročníku základní školy (The educational and teaching objectives of zoology instruction in the 6th class of basic school)
Přírodní vědy ve škole, 32, 1980/1981, No. 1, pp. 4-6.

The article deals with the educational and teaching objectives of zoology instruction in the 6th class of basic school from the point of view of the new teaching syllabus and textbooks for the didactics of biology. The author deals with the content of zoology instruction from the teaching point of view (problems of morphology, anatomy, physiology, ethology, embryology, ontogeny and phylogeny, ecology, systematics and zoo-geography) and from the educational point of view (education towards a scientific worldview, science education, education towards socialist patriotism and proletarian internationalism, defence education, health-care education, education towards parenthood and sex education, polytechnical education, education towards environmental conservation and nature conservation).

25. ZVEREV, I.D.: O sovershenstvovaniyi prepodavaniya biologii v svete resheniy XXVI syezda KSSS (Concerning the improvement of biology instruction in the light of the resolution of the XXVIth Congress of the Communist Party of the Soviet Union)
Biologiya v shkole, 55, 1981, No. 5, pp. 24-28.

In the area of biological education, tasks can be summed up by the following:
- to teach pupils in a comprehensible manner the foundations of scientific knowledge and the specific aspects of the structure and function of living systems;

- to form in pupils a scientific worldview and a feeling of responsibility for conservation of the environment;
- to develop gradually the most important theories of contemporary biology concerning ecological and evolutionary problems and their significance for practice;
- to point out the social significance of contemporary biology (polytechnization);
- to strengthen civic and patriotic feelings in pupils, etc.

5. Biology teaching as a component of instruction in general education schools

26. STŘIHAVKOVÁ, H. - SÍBRT, F.: K masovému zahájení vyučování přírodopisu v 5. ročníku základní školy podle nové koncepce (On the beginning of nature science instruction in the 5th class on a mass scale according to the new teaching concept)
Přírodní vědy ve škole, 32, 1980/1981, No. 1, p. 3.

In this school year the new concept of the Czechoslovak teaching and educational system is being introduced into the upper classes of basic school. In the school year 1979/1980 natural science teachers in basic schools participated in re-qualification courses. General information concerning the concept of botany teaching has already been published in various issues of this journal. Teachers should above all stress the key notion of evolution and the logical linkage of various topics, as well as the educational impact of various topics. Great stress should also be placed on knowledge of basic subject-matter. The introduction of the new concept should also lead to a revision of the stocks in the biology study rooms and to closer cooperation between biology teachers and teachers of practical work.

5.9 Elective biology instruction in general education schools

27. ZABEL, E.: Fakultativer Biologieunterricht-Funktionen, Ziele und Grundsätze (Elective biology instruction, its functions, objectives and principles) Biologie in der Schule, 30, 1981, No. 11, pp. 449-456. 1 tab.

Since biology hobby clubs have been introduced into the curriculum of the 9th and 10th classes and elective course into the upper grades of general education secondary schools, 10 years have elapsed and their theory has been developed. The purpose of this article is to assess the existing situation and approaches to this type of teaching. Among the typical characteristics of elective courses is the fact that pupils have chosen the subject voluntarily, that they are not given marks, instruction takes place in small groups, only on the basis of a general teaching syllabus; the participation of the Union of Socialist Youth, as well as various guests from works or scientific institutions are important. The author deals in detail with all these points. The function of elective courses also varies - they serve for instance to strengthen polytechnical education and they allow making maximum use of the regional principle in teaching. Among their pedagogical functions is their indicative purpose, as well as that of acting as an activating factor, and a career choice factor. In conclusion the author deals with the objectives of elective courses.

28. and 29. ZABEL, E.: Fakultatywne nauczenie biologii i jego rola w kształtowaniu osobnowości ucznia w NRD
(Teaching biology in elective courses and their importance for educating the personality of the pupil in the G.D.R.)
Biologia w szkole, 34, 1981, No. 5, pp. 280-282.
2 diagrams.

Elective course in biology in the G.D.R. have the form of hobby clubs in the lower classes and the form of practical excercise periods in the upper classes. Hobby clubs in the 9th and 10th classes and elective courses in the classes immediately preceding the school-leaving examination represent differentiated instruction, which is an important component of biology education provided in secondary school. Together with mandatory biology courses they contribute to improving education and teaching. The work done by pupils in these voluntary forms of instruction indicate that they also make an important contribution to the education of the pupils' personalities. In the upper classes they contribute to preparing pupils for biology and biology releated subjects taught at institutions of higher learning. Elective course differ by the fact that participation is voluntary, the state teaching syllabus provides only guidelines, pupils do not receive marks, the participation of the Union of German Youth and other organizations is greater and work is done in small groups composed of 8 - 15 pupils for a single class. Elective courses have various educational objectives, they stress the polytechnical nature of education and link school closer to practical life. They also make it possible to react in a lively manner to new events taking place in biology and to making use of the territorial opportunities provided by the locality of the school. Elective courses also have a pedagogical function, since they improve individual skills and support the increased activity of pupils. Elective courses also have more specific objectives: they contribute to more learning, better skills, as well as improved philosophical, worldview, ethical and aesthetical learning. As far as the content of what pupils learn is concerned, elective courses provide more and better knowledge and a better understanding of those notions which generally reflect nature, as well as practical applications of theory. Pupils gain a better understanding of the role of science in society, they gain a better awareness of its importance in society and a more creative attitude towards science. Work in elective courses approaches scientific forms of work in biology.

6. The educational and teaching process of biology instruction and its gnoseological, psychological and logical foundations.

30. KREMER, B.R. - WALBERG, Y.H.: A Synthesis of Social and Psychological Influences on Science Learning Science Education, 65, 1981, No. 1, pp. 11-13. 5 tabs.

Since 1953 educators and psychologists have been studying the social and psychological influences which have an impact on pupils studying science. The purpose of this paper is to provide a synthesis of the findings on the basis of quantitative methods of social studies and psychology. The cited study examined three areas: the motivation of students, their domestic or family environment and the school environment provided by their peer group. The authors' analysis concerns the time devoted to instruction, the quality of preparing lessons and laboratory work. The tables provide a summary of findings.

6.1 The forming of biological notions

31. BELL, B.: When is an Animal Not an Animal ?
Journal of Biological Education, 15, 1981, No. 3,
pp. 213-218. 3 figs.

What pupils understand by the term "animal" was the subject of a study among 39 pupils aged 10, 11, 13 and 15 years at a New Zealand school; the study used the methods developed by profs. Osborn and Gilbert. The author acquaints readers with findings, which provide biology teachers with new impulses for explaining this seemingly simple notion. The reasons which pupils cited in support of their notion of an animal are also very interesting and are summed up in a table. The author provides teachers with information on how to proceed with young pupils.

32. TSOLOVA, L. - BOYADZHIYEVA, A.: Formirane na ponatiyeto "optimizatsia na zhivite sistemi"
(Forming the notion of "the optimalization of living systems")
Biologiya i khimiya, 24, 1981, No. 5, pp. 30-34.

The article contains methodological recommendations concerning the teaching of some topics from the teaching syllabus for the 5th to 10th classes which help to clarify and develop the term "homeostasis" and "optimalization" in living systems.

In the 5th class these notions can be clarified at the cellular level, in the 6th class on the basis of the example of plant organisms and invertebrates. In the 7th class pupils begin to understand ecological contexts and in the 8th class they encounter the relevant terms at the level of the human organism. In the 9th and 10th classes they should achieve a complex understanding of the principles of evolution which living organisms undergo and how they adapt to the constantly changing conditions in their environment.

33. HEINZEL, I. - REINKE, C.: Begriffliches Einordnen (und Ausschliessen) - ein Beitrag zum Festigen in Klasse 5 (The assigning and exclusion of notions - a contribution to strengthening knowledge in the 5th class)
Biologie in der Schule, 30, 1981, No. 1, pp. 15-21.
14 figs., 5 surveys.

One of the objectives of biology instruction is learning permanent and applicable knowledge. The assigning and exclusion of notions can help to serve this surpose, by clarifying the relations which exist among various notious and this in turn supports the ability of the pupil to draw his own conclusions and to make definitions. In this manner notions are learnt in several stages. The author distinguishes three alternatives is assigning notions. In the first, both the notion to be assigned, as well as the one to which the assigning will done are given. In the second, the notion to be assigned must be formed, while the notion to which it is assigned is provided. In the third alternative, the opposite is true. All three

41

alternatives are explained on the basis of a number of examples and with the help of a survey which sums up the procedure.

34. LITSCHE, G.: Theoretische Biologie und Biologieunterricht (Theoretical biology and biology teaching) Biologie in der Schule, 30, 1981, No. 12, pp. 521-524.

The basic aim of biology teaching is to answer the question of "what is life?". This objective has already been stressed by the didactics of biology in the past (Lüben, Schmeil, Jauch, etc.). Present-day biology studies life at the molecular, biological and biocoenosis level and this is reflected in school instruction. The old methodology of biology is, however, not in accord with this requirement. On the basis of a generalizations of biological facts we arrive at theoretical biology, which in turn leads to changes in the notions which form the subject-matter of biological education. The essential characteristics of new notions in biology is that they are formed by idealized models and definitions of abstractions, which the author documents on the basis of examples (genes, DNA models, theoretical populations, ideal environments). The author also discusses the problem of the structure of biology subject-matter.

35. MATZKE, M.: Zur Bildung der Begriffe "Kriechtiere" und "Lippenblütengewäsche" in Klasse 5 (Forming the notions of "reptile" and "Lamniaceae" in the 6th class)
Biologie in der Schule, 30, 1981, No. 1, pp. 10-14.
2 figs.

The article concentrates above all on the forming of notions with the help of ostensive teaching media. The author divides the forming of every notion into several stages: determining its objective, the strengthening and/or repetition of what has already been learnt (with the help of a worksheet) and work with new material (the application of knowledge). Worksheets can be used to form both notions cited in the title, as well as models and pictures. The author goes on to analyse other stages in the forming of notions.

6.5 The forming of habits and skills

36. DIETRICH, G.: Könnensentwicklung im Biologieunterricht (The development of abilities and skills in biology teaching)
Biologie in der Schule, 30, 1981, No. 1, pp. 3-10.

The objective of developing abilities and skills is that pupils learn knowledge in an independent manner, that they learn what applications this knowledge has and are able to chose procedures which are adequate to this knowledge. To this should be added the ability to solve problems, assign notions and to describe biological processes, as well as being able to determine relations existing between structure and function. Pupils should also learn to think in the context of the broader problem, be able to cope with bourgeois concepts and be able to communicate. The author goes on to discuss the activities of pupils during biology lessons, which depend among others on the nature of the subject-matter being taught. Those methods which are connected with natural science methods, cognition, observation, experiments and modelling should predominate. The author goes on to define 26 such activities. In the course of teaching the following aspects should be taken into account: The role of activities in learning, the effectiveness of activities for political and ideological education, for the forming of character traits, etc. An important requirement in developing abilities and skills is the principle of continuity, i.e. the smooth development of learning from the 5th to the 10th class. The methodological aspects of developing activities in biology teaching are clarified on the basis of the example of the topic Respiration. The decisive precondition for developing various activities in class is the correct planning of the lesson. The author deals with this aspect in detail.

6.7 Guiding pupils towards successful learning in biology. The activation of pupils. Self-control.

37. BECKMANN, H. - WAAGE, K. - KLEIN, I.: Zum aktuellen Thema (Concerning a current problem)
Biologie in der Schule, 30, 1981, No. 2-3, pp. 99-102.

This article contains three independent sections concerning the new approach to biology instruction in the 8th class, whose common topic is the role of assignments given to pupils. These assignments are important for the activation of pupils, but they should be planned in such a way as to be solvable. From this point of view the authors assess various assignments.

38. BOGOYAVLENSKAYA, A.Y.: Razvitiye samostoyatelnosti uchashchikhsya pri obuchenii botanike (Developing pupils' independent work in botany teaching)
Biologiya v shkole, 55, 1981, No. 1, pp. 35-39.

On the basis of an analysis of the teaching syllabus for botany used in the 5th class, the author comes to the conclusion that the greater part of each lesson provides opportunities for independent work. However, which method of work provides optimum results in this aspect must be decided by the teacher. The development of pupils' independence is a long-term objective which should be divided into several stages:
1. the preparatory stage - for instance work with books (their illustrations);
2. forming pupils' skills in independent work - by giving them simple tasks, which require an analysis of the textbook and formulating answers to given questions;
3. increasing the share of independent work done by pupils, where they still require the help of the teacher and must use their own logical operations;
4. independent learning with the aid of various media, with only brief instructions from the teacher.

The author goes on to cite three examples to illustrate these 4 stages - on the basis of the topic Seeds.

39. HOCKE, C. - GEMEIHARDT, D.: Zu höheren Lernergebnissen in "schwierigen" Stoffgebieten ! (For better results in teaching "difficult" sections of the syllabus)
Biologie in der Schule, 30, 1981, No. 6, pp. 225-226.

The authors recommend that the discussion concerning the topic "How will biological knowledge become knowledge   for life ?" continue. The most interesting aspect of this discussion continues to be the problem of basic subject-matter, the pupils´ relevant manual and mental skills and learning a didactical approach to the explanation of biological phenomena and processes. Attention should be devoted especially to instruction in the 10th class where a large number of problems are found. The authors suggest the further direction this discussion should take and which problems form its subject.

40. HORNÍK, F.: Aktivita žáků při výuce biologie (The activities of pupils in biology instruction)
Přírodní vědy ve škole, 32, 1980/1981, No. 7, pp.236-249.

One of the current tasks of biology instruction is developing pupil activities and making pupils more active. Activities should be understood as a didactical principle which is implemented in all stages of instruction. Active cognitive attitudes lead to the forming of such traits, which are important not only for the pupil´s learning, but also for the whole development of his personality. A pupil´s activity should then be understood as a specific level of dynamics which are dependent on the implementation of such components as the anticipatory significance of the objective of the activities undertaken, the system of motivating factors, the demandingness of assignments as far as cognitive processes are concerned and the tension which develops on the basis of socio-psychological relations. A knowledge of the objective towards which pupils in the course of instruction are led can make their activities more dynamic. After determining the objetive of teaching a specific topic, a didactical analysis of the subject-matter is required, during which the objectives contained in the teaching syllabus are clarified. At the same time the educational and teaching values of the subject-matter become clear. The objective at the same time serves as a motivating factor, i.e. a factor which provides energy and influences behaviour.

The author goes on to discuss group and problem teaching and cites two examples of problem situations.

41. KINTZEL, W.: Jahresarbeiten - eine Möglichkeit zur geistigen Aktivierung der Schüler (Annual assignments - an opportunity for the mental activation of pupils)
Biologie in der Schule, 30, 1981, No. 7/8, pp. 321-324.

Mental activation cannot be developed independently, but rather requires specific impulses. One of these can be the giving of annual assignments, which have the following educational and teaching objectives: a purposeful materialistic and dialectical approach to nature, the ability to observe, to formulate hypotheses, to practically implement ideas, be able to work independently with literature, make maximum use of the methods and procedures provided by the natural sciences and to stimulate the interest of pupils for creative work. The author goes on to discuss the giving of assignments, the demands which should be made concerning their quality and how they can be made use of in class. In conclusion a survey of suitable topics is provided.

42. LEONARD, W.A.: Designing an Extended Discretion Laboratory Investigation
The American Biology Teacher, 43, 1981, No. 5, pp. 254-256. 3 figs.

The basic idea of this article concerns the education of pupils towards independent work during laboratory periods. The author descibes the methodological procedures used in such periods, beginning with the selection of the assignment, the explanation of various notions, dividing the assignment into shorter sections and the objectives of the assignment. During laboratory excercises the teacher should offer advice, observe the work of his pupils, etc. Assessments of the laboratory assignments should be undertaken by the teacher on the basis of specific criteria.

43. LIEM, U. - PFIRMANN, H. - RUPPRECHT, R. - SCHWEHM, W.: *Anregungen zur Schülerselbstkonstrolle* (Incentives for the self-assessment of pupils)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 12, pp. 461-466. 4 worksheets.

Pupils' self-assessment is found to be a very effective stimulus with a strong educational impact. The more rapidly a pupil discovers his own mistake, the more quickly he will overcome it. This also does away with the hidden and destructive consequences of control carried out by parents or teachers. Each pupil is able to intensively deal with his own errors and work at doing away with them. Self-assessment does not preclude work in groups. The positive outcome of such work should be a motive for further work. The author provides practical examples of tests which can be used for self-assessment.

44.OCHKUR, Y.A.: *Iz opita organizatsii samostoyatelnoy raboti uchashchikhsya na uroke* (On experiences with organizing independent work by pupils during lessons)
Biologiya v shkole, 55, 1981, No. 5, pp. 36-38.

The author describes, on the basis of the example of two topics - increases in stem thickness and basic methods used in plant selection - how independent work by pupils can be included in various parts of the teaching lesson. She makes very good use of didactical cards (where specific formulations of questions are written), which she gives to pupils. The pupils return the cards after 7 minutes during which they write answers on pieces of paper which are then given to other pupils for assessment. During the next part of the lesson the answers were assessed and corrected. A similar, even if more difficult method can be used in the 10th class. The example cited concerns genetics. This method of the independent fulfilling of tasks improves the cognitive activity of pupils.

45. PIOTROWICZ, M.: Rozwijanie samodzielności uczniów w szkołach francuskich (Developing the independence of pupils in French schools)
Biologia w szkole, 34, 1981, No. 2, pp. 107-111. 2 figs.

The didactics of biology tend to stress to an increasing extent the independence of pupils and their active participation in class work. Pupils should contribute to solving problems, forming notions, the formulation of hypotheses and seeking ways to solving problems. They should also be able to independently observe and experiment. The author provides information about her experience gained during visits to classrooms during biology lessons at the College Modetour Crecy les Olis, near Paris. The teacher was Mrs Yvette Ginsburger-Vogel, who is the co-author of a biology textbook for the 4th class (1977) and for the 5th class (1978). The author analyses the lessons and especially the activity of pupils in them and their independent work. The first lesson was devoted to the topic "Are epidermal formations, such as feathers and fur, good thermal isolators ?". The second lesson was devoted to the topic "Does mold obtain nutrition in the same way as green plants ?".

6.72 The education of logical thinking in biology instruction, logical procedures

46. ALTMANN, A.: Logický postup indukce a dedukce ve výuce biologie na základní škole (The logical steps of induction and deduction in biology teaching in basic school)
Přírodní vědy ve škole, 32, 1980/1981, No. 8, pp.288-289.

The foundations of the notion-forming process include analysis, synthesis, induction, deduction, comparison, specification, abstraction and generalization. In biology instruction and in the didactics of biology an incorrect attitude towards deduction as a logical procedure has developed as a consequence of overestimating the importance of induction. During the course of instruction the inductive and deductive stages should be distinguished. During the induction stage a generalization takes place on the basis of various examples, while in the deductive stage the pupil solves a specific class of problems on the basis of having learnt a specific rule, which he assigns to a previously learnt general notion. The correctness of the deduction depends on the quality of the induction. The practical value of deduction in biology teaching is that it makes it possible to rapidly and correctly infer the correct solution to a specific problem (or problem situation), if generalized knowledge, a rule, definition or law are known. Hence deductions are more difficult for pupils to understand in the course of an exposition than the process of induction.

47. DILKINA, B.J.: Razvitiye na poznavatelnite sposobnosti na uchenitsite chrez obobshchitelnite urotsi v shesti klas - zoologiya (Developing cognitive abilities of pupils in lessons devoted to generalizations in the 6th class zoology course)
Biologiya i khimiya, 24, 1981, No. 1, pp. 33-39.

Guiding pupils towards the generalization of knowledge they have gained is an important logical process, which teaches pupils to think in a logical manner and to form structures of knowledge in the studied discipline. The author describes how to proceed in generalizations and in the structuralization of the subject-matter being taught on the basis of the example of a survey of Coelenterara, Annelida and parasitical nematodes. The survey is shown in the form of tables of basic morphological, physiological and ecological facts. In conclusion of each topic the author provides control questions, whose solutions will demonstrate how the pupil has mastered the process of making generalizations and the classification of new knowledge.

48. KABASANOVA, M. - TROPLEVA, K.: Otnosno metodikata na pregorornite i obobshchitelnite urotsi po biologiya (rasteniya,5. i 6. klas) (Concerning the methodology of lessons with the utilization of analysis and the making of generalization of plants in the 5th and 6th classes)
Biologiya i khimiya, 24, 1981, No. 2, pp. 30-37.

Those lessons where expositions and generalizations predominate are often underestimated. Generalizations should be based on preceding knowledge gained by the pupils, on the basis of a correctly prepared exposition.

The generalization itself can be carried out in three different ways:

1) as an elementary empirical generalization based on practical activities and comparisons, on the basis of the pupil's own observation and/or experiment,
2) in the form of the supervision of pupil's mental activities towards uncovering relations between objects and phenomena,
3) as the outcome of deductions.

The author cites examples for each of these methods pertaining to the botany syllabus. The outcome of generalizing knowledge concerning a specific topic can then be plotted on graphs and assessed statistically.

49. LEVINA, M.M.: O logicheskoy strukture uchebnogo materiala uroka biologii (Concerning the logical struture of the subject-matter of a biology lesson) Biologiya v shkole, 55, 1981, No. 1, pp. 30-35.

The article stresses the necessity of a teacher preparing the structure of a specific teaching lesson from the point of view of its logical integrity, and on the basis of the objective of the lesson, as well as its content. 4 specific requirements are formulated concerning the logical structure of the subject-matter of a lesson:

1. The logic of the scientific aspect should be considered in relation to the logic of the exposition used by the teaching subject. A purely inductive method is better for young pupils and a deductive method for older pupils.

2. Both methods should be combined - a teacher should

proceed from the special to the general and back again to the specific.

3. It is necessary to analyse the content of the subject-matter in relation to how well prepared the pupils are to recieve information and what skills they have in independent learning.

4. The structure of the subject-matter should be pedagogically orientated in such a way that also other objectives and tasks can be fulfilled.

The author goes on to cite examples of analysis and the forming of notions in the subject-matter of the 5th class - the plant as an integrated organism. The skills of the teacher in organizing the subject-matter to be taught into logical structures greatly increases the effectiveness of the lesson and represents a means for education towards precise and logical thinking in pupils.

50. PALKA, L.: Strukturalizacja wiedzy z zakresu dydaktyki biologii (The structuralization of knowledge in the didactics of biology)
Biologia w szkole, 34, 1981, No. 5, pp. 277-279. 2 figs., lit. 7.

In the didactics of biology there is an increased interest in problems concerning the structure of the subject-matter of various teaching subjects studied at various levels of education. The ability of pupils to gain scientific knowledge in a specific structure is the basis of this problem. Contemporary studies have indicated the existence of a relationship between the degree of organization of the material taught by the teacher and the speed with which pupils learn the structure of the material. Individual structures of scientific knowledge are of importance in this context, as well as the ability of the pupils to order and structuralize scientific knowledge. The structure of knowledge of a pupil is not isomorphous, as is not the structure of knowledge passed on from the teacher to the pupil, or the knowledge the pupils gains in practical excercises, seminars or in the independent study of textbooks. Each student transforms knowledge and forms his own cognitive structure, which is stimulated by the inherent structure of the knowledge, when the criteria according to which the material is ordered are understood. A team led by Z. Wolodarski (1979) studied the reception of expositions at institutions of higher learning and found that the structuralization of the material was of great importance for the process of learning. This requires stressing the most important points, the forming of knowledge structures and stressing the importance of relations between them. All the information given to the learner should aim at achieving a full understanding and a linkage to the knowledge acquired previously; this activates pupils and provides motivation for further study. Pupils learn to create structures out of the basic elements of science. To learn to structuralize means to understand various units of information in their mutual relation. Structuralized knowledge is easier to understand and enables the pupil to form cognitive units which can be learnt. Structuralized subject-matter is more permanently committed to memory when compared to an unstructured item of information. Hence structures influence logical and creative thinking. The author in conclusion demontrates the structure of basic knowledge concerning the didactics of biology.

6.73 Developing language skills in biology instruction

51. MILLIGAN, Y.C. - ORLICH, D.C.: A Linguistic Approach to Learning Science Vocabulary
The Science Teacher, 48, 1981, No. 2, pp. 34-35.

Biological terms are considered to be very exotic by many students who are beginning to learn biology. One of the reasons for this is the fact that Latin has disappeared from secondary school curricula as a mandatory subject, so there is no one to explain at least the origins of a number of biology terms. The authors suggest a method of overcoming this block by explaining the roots of various words with the use of linguistic methods, especially by analysis of words (for instance aquarium = aqua-water and arium - vessel). In the authors' experience pupils are able to remember biological terms much better, when they have more to rely on the than mere learning by rote.

6.74 Logical models in biology instruction, cybernetic models in biology instruction

52. COLETTA, Y. - BRADLEY, Y.: A Model for Teaching Ecology
The American Biology Teacher, 43, 1981, No. 6, pp. 320-322 and 339.

One of the reasons why ecology is a difficult subject for students to learn is the fact that mutual relations between organisms are obscure and are often lost in a flood of details. The authors suggest the uniform teaching of a basic ecology course based on an ecology model made up of four sections: the lithosphere, hydrosphere, biosphere and atmosphere, which intersect each other and influence each other in the flow of solar energy. They also describe how such a model can be used in instruction and how to interpret the mutual interaction of the above cited sections. It should help students to better understand basic biological relations, without which life would not be possible on Earth.

53. HASS, G.: Modellvorstellungen über die Materialität des Vererbungsprozesses im Unterricht der Klasse 12
(Model notions concerning the material nature of heredity in biology teaching in the 12th class)
Biologie in der Schule, 30, 1981, No. 7/8, pp. 333-335.
2 figs.

The author has been successful in demonstrating the material nature of heredity by adapting a diagram used in communication technology to represent the transmission of genes. The components of communicate information include a source, transmitter, channel, receiver and output. This model also makes it possible to explain the principle of coding and decoding and to influence pupils from a worldview point of view (the material nature of the information carriers in heredity.)

6.8 Scientific education in biology instruction

54. MARTY, B.: "Vous voyez bien que ....." ("Surely you see that ..."
Biologie, Géologie, 68, 1981, No. 2, pp. 363-378.
5 figs.

In the author's opinion the manner in which the material concerning the reproduction of animal species is presented in the 6th class is not satisfactory. He describes various shortcomings and cites as an example the topic "Reproduction" as an aspect of general knowledge and what pupils know about sexual reproduction, the problem of "female eggs" and their fertilization. He then discusses how to make these problems comprehensible to pupils in the 6th class. Also specific examples of ostensive teaching are provided in the pictures attached. The method recommended by the author aims to arousing pupils' interest and attention and leads them to ask intelligent questions.

55. SPRAY, M. - ROBERTS, D.: Death and Decay in the Classroom
Natural Science in Schools, 19, 1981, No. 2, pp. 34-40.
3 figs.

The purpose of this article is to explain to pupils the dialectics of natural processes where the death and decay of an organism contribute to the development of new life. The authors explain what the causes of death are (old age, illness, accidents) and what supports the decay of the dead organism (bacteria, fungi, molds). Pupils thus learn to look upon death without prejudices as one of the natural phenomena of the world's order, where everything including birth and death are part of a harmonious whole. The examples cited come from a large selection of material and the graphical representations of decay show its necessity for maintaining life, which from the moment of its development is predestined again for death and decay.

6.81 The forming of a scientific worldview in biology instruction

56. MILNE, D.H.: How to Debate with Creationists - and "Win"
The American Biology Teacher, 43, 1981, No. 5, pp.235-245.
10 figs.

The author, who is a biologist and ecologist, has participated in many discussions with creationists who base their theory on the literal biblical description of the creation of the world. He describes the arguments they set forth in defending this idealistical theory, what strategy they use and the conclusions they arrive at. He then goes on to describe his own strategy, which is based on the many pre-historical findings on the basis of which science has formulated the theory of evolution. He also points out various theoretical mistakes, which evolutionists often make in discussions, when they do not take creationist´ theories seriously and instead of disproving them, consider them to be unworthy of serious debate. The article provides very good suggestions for ways in which to disprove creationist theories.

57. PAWELZIG, G.: Wie global sind die "globalen Probleme"? (How global are "global problems".)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 49-54.

By global problems the author means basic questions concerning the material existence and future of human society. These problems should be considered in relation to other problems and thus we should differentiate between what is correct and the opinions of people like Meadows and others. Various existing crises should be considered manifestations or aspects of a human society undergoing a crisis of development which is the outcome of the transition to historically new forms of productive, living and ideological systems. The opinion that all nations are in the same situation as would follow from the term "global" is not correct. Maintaining peace and putting a stop to armaments are truely global problems. The damage done by wars is illustrated by the author on the basis of examples from history up to the present.

58. RASHKOVA, S. - KRSTEVA, M. - GONEVA, D.: Vzpitanie na sotsialna i ideologicheska nasochenost u uchenitsite chrez uroka "Rolyata na sotsialnite faktori za formiraneto na choveka" (The supervision of the social and ideological education of pupils in the topic: "The role of social factors in the making of man")
Biologiya i khimiya, 24, 1981, No. 5, pp. 41-46.

The organizational form of the lesson on the topic cited in the title is a seminar. During its course there is a debate based on the preceding independent work done by pupils in preparation for the seminar. The authors recommend the reading of Engels' The Dialectics of Nature, Robinson Crusoe by Daniel Defoe and Courage by Angelov. Besides this, use can be made of pupils´ knowledge in history and geography. The most important ostensive media for this topic include diagrams on the variability of man and drawings of various parts of the brain. This topic should be taught in several stages, where the preparatory stage is of special importance; pupils read selected parts of Engels´ work and prepare assignments. The nucleus of the lesson should be in an analysis of the biological and social factors determining man which are clear both in ontogeny and phylogeny.

59. VELIKOV, V.P.: Formiraneto na novata lichnost chrez obuchenieto po biologiya (The forming of a new personality in biology instruction)
Biologiya i khimiya, 24, 1981, No. 6, pp. 22-29.

The author first discusses methods by which the teacher can learn about the personal characteristics of his pupils in a general education secondary school; especially practical excercises in biology provide the opportunity for gaining such knowledge while at the same time providing an opportunity to teach pupils and influence them. Teachers can also give their pupils questionnairs, or pedagogical and psychological diagnostic tests, as well as undertake their own observations and also analyse the results obtained in biology by individual pupils. On the basis of this preliminary material the teacher can then draw up a plan for influencing personalities. At the beginning of each lesson, time can be devoted to developing logical thinking and independent cognition. During practical work the teacher can concentrate on the cultivation of the following personal characteristics: ingenuity, alertness, independence, a more profound interest in the subject. The author cites a number of examples of problem assignments in micro-biology and bio-chemistry. These assignments develop the abilities of pupils, as far as theoretical thinking is concerned, and also guide pupils towards independent research activities.

6.82 Atheistic education in biology instruction

60. BRUSH, S.C.: Creationism/Evolution: The case against "equal time"
The Science Teacher, 48, 1981, No. 4, pp. 29-32. 4 figs.

A college professor here discusses the struggle going on between various schools of biologists: those who stress the biblical version of the development of living nature and those who are evolutionists. The main argument of creationists is that evolutionary theory is unable to explain all phenomena. The author stresses that this is no reason to give both theories equal time in school. Evolutionary theory is still capable of explaining much more than creationism, in a scientifically acceptable manner.

6.83 Education towards socialist patriotism and proletarian internationalism in biology instruction

61. FRITSCH, R. - FRITSCH, H.: Fakten, Wertungen und Orientierung des X. Parteitages in den Biologieunterricht einbeziehen ! (Include facts, assessments and the orientation of the Xth Congress of the Socialist Unity Party of Germany into biology instruction !)
Biologie in der Schule, 30, 1981, No. 12, pp. 528-530.
2 tabs.

On the basis of issued directives, topics in the teaching syllabus for biology have been selected and brief instructions have been prepared for the task cited in the title. Each problem to be discussed has the number of the topic in the teaching syllabus and the quotation of the relevant document from the Party Congress (which include reports to the Congress and directives for the five-year plan of development of the national economy in the period 1981-1985). Also other brief information or examples concerning the given problem are given, which can be used in instruction.

62. FRITSCH, H.: Unsere Schüler mit den Materialen des X. Parteitages der SED vertraut machen (How to acquaint pupils with the documents of the Xth Congress of the Socialist Unity Party of Germany)
Biologie in der Schule, 30, 1981, No. 9, pp. 362-363.

In the 10th and 12th classes at the end of the school year there are several lessons available when it is possible to discuss with pupils the social significance and status of the natural sciences. In this context there is also an opportunity to make use of the documents of the Xth Congress of the Socialist

Unity Party of Germany (in the context of for instance the output of animal fodder). The author also cites some of the data contained in the directives for the five-year plan which can be used in class.

63. REBROVA, L.V.: Oznakomleniye uchashchikhsya s zadachami i perspektivami razvitiya narodnogo khozyastva nashey strani (Acquianting pupils with the tasks and outlooks for the development of the national economy in our country)
Biologiya v shkole, 55, 1981, No. 4, pp. 19-24.

The article publishes recommendations for the study of the documents of the XXVIth Congress of the Communist Party of the Soviet Union during biology instruction and in the extra-curricula work of pupils. These documents should not be merely read. Their ideological depth and creative content will become apparent only if they are organically integrated into the biology teaching syllabus. The article cites various examples.

6.84 Work education in biology instruction

64. IVANOVICH, K.: Izgrazhdane u uchenitsite na tvorchesko otnoshenie k selskostopanskiya trud (Forming a creative approach to agricultural work among pupils)
Biologiya i khimiya, 24, 1981, No. 6, pp. 30-35.

The article analyses the thoughts of V.I. Lenin and L.I. Brezhnev concerning the importance of agriculture and its gradual industrialization. To do away with the differences existing between industry and agriculture it is necessary to educate youth already beginning with basic school, but especially in schools and apprentice training centres specializing in agricultural occupations. Also the technical interests of young people should be made use of; young people should be educated also individually in hobby clubs and in the course of youth work done in agriculture. Also young technical innovators should be encouraged in concentrating on the mechanization, chemization, concentration and specialization of agricultural production, whose future depends on the creative talents of those who today are still at school.

6.86 Aesthetical education in biology instruction

65. LAZAROVA, M.: *Izpolzuvane na izkustvo na esteticheko vzpitanie na uchenitsite v obucheniyeto po biologiya*
(The use of art for the aesthetical education of pupils during biology instruction)
Biologiya i khimiya, 24, 1981, No. 4, pp. 22-24.

There are many writers, artists and composers who have been inspired by nature. The author cites examples of works of art from various periods and genres which can serve as a living image of nature, while at the same time causing pupils to experience an artistic reflection of reality. Among such works of art, which have a strong influence on the imagination and emotions of pupils, are Hemingway's Old Man and the Sea and Herman Melville's Moby Dick. The article also cites a number of examples from music and the visual arts which can be made use of to motivate a biology lesson or to demonstrate a specific natural phenomenon in an artistic rendition.

6.87 ication towards nature conservation and environmental conservation in biology instruction

66. BREITENMOSER, U. - SCHWARZ, U.: Naturgärten
(Natural gardens)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 8, pp. 225-228.

The development of industry and the scientific and technological revolution are the cause of the fact that in our vicinity and in nature gradually various species of flora and fauna are disappearing, so that our natural environment is becoming constantly poorer. The Red Book of Threatened Flora and Fauna Species is becoming increasingly more extensive. The author describes the possibility of saving our plants and animals in natural gardens, which can be built in residential areas, where often up to 80 % of the total area has not been built upon. The problem is that in these gardens we must not cultivate exotic plants, but rather those domestic species which grow wildly in marshes, meadows, forests and in water, as well as shrubs and trees. Wildly living fauna will soon populate such a garden and thus a natural living community will soon develop, in which flora and fauna can survive.

67. BRIEME, J.: Naturnaher Nutzgarten (Useful gardens close to nature)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 8, pp. 246-249. 4 figs.

At present a great deal of energy is devoted to growing food without the aid of chemicals (including fruits, vegetables and cereals). Various poisonous substances, such as chlorated carbohydrates, heavy metals and radioactive isotopes penetrate cultivated plants, domestic animals and through food into the human body. The adding up of these substances through food chains and their effect on those animals which stand at the tip of food chains or food pyramids, such as predators, birds of prey, owls and man, can be very dangerous. For this reason people try to cultivate in their own gardens plants without the use of chemicals. We should also aim at preventing displacement of the soil, to avoid too dense plant beds and to fertilize the plant beds with compost, mulching, using green fertilizer, organic fertilizer, mineral powders, and or to have the soil constantly covered by plants. It is necessary to know the composition of the soil and to improve its quality all year: acidic soil should be fertilized with calcium fertilizers, etc. The water content of soil constantly changes, peat is difficult to moisturize and in this sense its importance has been exaggerated. It has been shown that various plants can have a positive effect one on the other, for instance carrots and onions. For instance decorative marigolds are very effective against soil nematodes, etc. The author recommends hedges instead of fences and also stresses the need to form a proper environment for domestic species of birds in our gardens.

68. ČEŘOVSKÝ, J.: Žhavé problémy světového životního prostředí 1980 (Burning problems of the world environment - 1980)
Přírodní vědy ve škole, 32, 1980/1981, No. 9, pp.332-333.

The author deals with a report prepared by the United Nations Environmental Agency concerning the state of the environment in 1980, which was published on

June 5th of that year (World Environment Day). As in past years, four problems have been chosen as exeptionally important: the global " hothouse effect" which concerns increased amounts of carbon dioxide in the atmosphere, the problem of the danger posed by heavy metals and the increased dangers of transportation, where governments are urged to give priority to mass transport systems. The fourth problem concerns children and the environment.

69. Friedrich Junge über den "knick" - 1981 (Friedrich Junge and the so-called "knick")
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 10, pp. 300-301.

The article is an excerpt from a book by Friedrich Junge, a foremost German didactician of biology who wrote at the end of the last century, called "Die Kulturwesen der deutschen Heimat nebst ihren Freunden und Feinden, eine Lebensgemeinschaft um den Menschen". The term "knick " is untranslatable and means a barrier of soil, which originally approximately measured 1 meter in width and height, on which shrubs were planted. On both sides of the barrier were trenches made when the soil for the barrier was excavated. These barriers were planted with oaks, beeches, birches, ashes, maples, hawthorns, filberts, adlers, etc. The walls of the barrier were planted with blackberries, hip roses, raspberries, blueberries, strawberries and various flowering plants and grasses. Essentially this was a miniature forest, which also included creeping and climbing plants, such as hops, etc. After 7 to 14 years the knick was cut and could be used as a source of fuel. The knick also provided shelter for wild animals, provided protection against the wind and snowdrifts, provided a home for insectivorous bi and thus improved the crops on the surrounding fields. The excerpt indicates how old endeavours for a culturally and ecologically sound landscape are.

70. FRIEMANN, H.: Sperber und Habicht - heimtückische Meuchelörden.Literarische Lehrbeispiele zur Entstehung und Wirkung menschlicher Vorurteile (The falcon and goshawk as treacherous murders. Literary examples for class work concerning the rise and influence of human predjudices)
Der Biologieunterricht, 17, 1981, No. 2, pp. 50-77.

The author has selected from German literature of the XIXth and XXth centuries passages concerning birds of prey and owls. He demonstrates how the image of these birds has undergone gradual change, until the present. Still a number of predjudices exist. Incorrect ideas are the outcome of human endeavours to classify birds according to a sole criterion; into those that are, and those that are not useful to people. The examples concern above all the falcon and the goshawk. Such a distinction is alien to contemporary scientific ideas concerning ecology and the place and function of birds of prey and owls in the ecology of a healthy landscape. In the final part of the article the author criticises human behaviour towards birds of prey and owls and compares our knowledge of these birds at the end of the last century and today and the consequences of an anthropomorphic attitude. This material can be used for improving motivation and as an illustration of sections of the teaching syllabus concerning birds of prey and owls.

71. FRILEUX, P.N.: Généralités sur la végétation de la Haute Normandie (General information on the vegetation of Upper Normany)
Biologie, Géologie, 68, 1981, No. 1, pp. 77-85.

In this short study the author stresses the oldest, indigenous groups of plants and those plants which are most widespread in the region. He groups them into four chapters: forest vegetation, meadow and steppe vegetation, vegetation of the Seine river delta. In each chapter he discusses individual plants which he comments and discusses in their specific aspects and/or how they differ from others. In conclusion he discusses the serious changes which have occured in the landscape due to industrialization, urbanization, the building of highways and the uncontrolled use of pesticides. Among negative changes are also the destruction of shrub hedges, the drying out of marshes, the industrial exploitation of peat, etc.

72. GALEYEVA, A.M. - KURCK, M.L.: Metodologicheskiye osnovi ekologicheskogo obrazovaniya i vospitaniya (The methodological foundations of ecological education and instruction)
Biologiya v shkole, 55, 1981, No. 2, pp. 6-14.

Ecological education and instruction are psychological and pedagogical processes which strive towards forming in pupils knowledge of the scientific basis for the utilization of nature and the necessary convictions and practical habits, as well as a specific orientation and active attitude towards nature conservation and the rational utilization and renewal of natural resources. The 1st Intergovernmental Conference on Environmental Education, held in Moscow in 1977, pointed out that this type of education is an objectively existing necessity. The methodological foundation of this education is Marxist-Leninist philosophy and especially the dialectical and materialistic concept of the unity between society and nature. The authors describe the historical development of opinions in this area, beginning with the classics of Marxism-Leninism, up to the present. Nature conservation and the rational utilization of resources have been decreed by the Constitution of the USSR in article 18 and have been made more specific in a number of resolutions of government bodies, most recently when the State Plan of Economic and Social Development of the USSR for the year 1981 was approved. In the final part of the article the authors discuss the role of the school system in the so-called ecologization of the teaching syllabus and curriculum. This requires a re-examination of the curriculum from the point of view of the impact of the material and spiritual activities of mankind upon the Earth's biosphere. The clarification of the essence of all measures which aim at the utilization and conservation of nature is a complex task for all teaching subjects.

73. HÁRIOVÁ, F.: Az ifjuság környezetvédelmi nevelésének lehetőségei (Opportunities for educating youth towards environmental conservation)
A biológia tanítása, 20, 1981, No. 6, pp. 170-173.

Since existing secondary school textbooks provide few opportunities for pupils to consider problems of environmental conservation, this study acquaints the reader in detail with the structure, objectives and tasks of the Budvás club which is considered to be a highly suitable forum for activities aimed at environmental conservation. The aim of these activities is not the education of experts, but rather citizens with a positive attitude towards the environment. In Hungary also a magazine called Budvár is published.

74. HINTERMEIER, H.: Naturschutz exemplarisch. Notwendige Massnahmen gegen den Bestandsrückgang des Rebhuhns (Exemplary nature conservation. Measures taken to stop the decline in the number of partridges) Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 10, pp. 312-318. 2 picture tables.

Since the fifties of this century in the whole of Europe the number of partridges has been steadily declining. This is a subject of interest not only to game keepers, but also biologists and ecologists. The main cause of this decline in numbers is not in the activities of predators, birds of prey or owls or because of over-population, but in the catastrophically deteriorated environment required by partridges. Contemporary modern agriculture is almost approaching industrial production and in this system partridges have no hope of survival. The causes of their decline are numerous; lack of suitable places to build nests, the reduced number of border strips between fields, the competition of the larger and more dynamic pheasant, lack of insects and weeds due to the use of insecticides and herbacides, etc. Pupils can become acquainted with these problems and how the trend can be reversed by providing the birds with feeding opportunities, places to build nests, using protective devices so as not to destroy partridge nests during hay cutting and harvesting cereals, collecting their eggs and breeding partridges to free them again into the wilderness, providing birds of prey with other food and limiting the hunting of partridges.

75. CHOPPIN, G.R.: Chemical Issues in Nuclear Waste Disposal

The Science Teacher, 48, 1981, No. 2, pp. 25-30. 5 figs.

The frequency of pollution by poisons and the social risk connected with this state of affairs have increased since World War II when nuclear waste has become a problem, one of the most serious of our time. Of the many suggestions made for the safe disposal of nuclear waste the author has chosen one which is considered to be of minimal danger to the environment. He then quotes a Swedish national study, which shows the scope of the problem. This study claims that the only safe disposal is in cement blocks.

76. KHRISTOV, K.B.: Obich i zashchita na narodnata priroda (A love of nature in our native land and its conservation)

Biologiya i khimiya, 24, 1981, No. 5, pp. 52-54.

The author describes the activities of hobby clubs at the Kliment Okhridski school in the town of Bila Slatina. The hobby club is active in two areas - one is concerned with public cultural activities and the other with scientific research, where the pupils undertake ecological observations outdoors and study the incidence of various plants and woody species. Such activities alternate with visits to concerts, theatres and the cinema, as well as the organization of discussions on literary topics which are connected with nature and its conservation. The activities of the hobby club also represent a real contribution to the solution of practical and theoretical problems connected with nature conservation in the course of school instruction.

77. YABLOKOV, A.V.: Okhrana mlekopitayushchikh v SSSR (The conservation of mammals in the USSR)
Biologiya v shkole, 55, 1981, No. 5, pp. 8-15.

In connection with the requirement that ecological aspects and especially nature conservation be stressed in biology instruction, the author recommends using in class specific problems and aspects of the conservation of mammals and the successes which have already been achieved in this area. On the basis of a historical survey of the protection of mammals in the USSR and a review of the organizations and agencies concerned with this problem, the author cites successful case histories of the sable, elk, beaver, walrus, seal, whale, polar bear and others. The basic problem has been to neutralize the influence of urbanization, the economic utilization of theoretical knowledge so as to maintain the numbers of each specie and the problem of adapting and thus saving 5 disappearing species of mammals.

78. KAMENKINA, I.: Prilozhenie na kompleksniya podkhod za izgraždane na prirodozashchitni vzgledi a uchenitsite chrez formi na rabota po biologiya (A complex approach to forming positive relations towards nature conservation in pupils with the aid of extra-curricula forms of activities in biology)
Biologiya i khimiya, 24, 1981, No. 4, pp. 28-31.

Extra-curricula forms of activities in biology, during which education towards nature conservation can take place, include excursions, hiking and picnics organized by hobby clubs, as well as various activities in Young Pioneer chapters. During these activities pupils are divided into smaller groups according to their age and interest. Each such group should recieve a specific assignment. Pupils from the 5th, 6th or 7th class can participate in the Young Pioneer Forestry Club. The best of them can form so-called "Green Watches". Other active young nature conservationists from the 7th and 8th classes can organize their own hobby club.

The author in the article describes various methods and media and stresses the complex relationships which exist between man and nature which he clarifies them from various aspects: the philosophical, that of the natural sciences, the socio-economic, hygienic, aesthetical, technical and pedagogical.

79. KEIL, W. Greifvogel - Niederwild - Kleintierhaltung (Birds of prey, small wild animals and the breeding of small farm animals)
Der Biologieunterricht, 17, 1981, No. 2, pp. 30-40.

Since April 1st, 1977 in the FRG a new game-keeping law is in effect, according to which all birds of prey are protected the year-round. Recently, game-keepers and the breeders of small farm animals have again criticised this law and have requested the abolition of year-round protection of the common buzzard and the goshawk. Game-keepers claim that birds of prey have caused a decline in the numbers of small wild game (partridges, pheasants and hares), while the breeders of small farm animals claim losses in poultry and the domestic pigeon. Scientific studies have, however, indicated that the main cause of the decline in the number of small wild animals are factors in the biotope or, in other words, in anthropogenic intervention into the landscape. Birds of prey are merely a regulating factor with a secondary role. The author describes the outcome of a study of the buzzard's and goshawk's food. The numbers of buzzards and their population density depend on the population of microtines and abiotic factors in the environment (mainly how severe winters are). The goshawk is not capable of catching a partridge, pheasant, hare or rabbit. 85% of its prey are birds and mammals represent only 14 %. Corvidae, jays and pigeons represent approximately 50 % of its food. The number of goshawks depends on the supply of food available, on disease, the incidence of parasites, the weather and intra--specie competition, which can lead to stress situations. Small wild game animals have a negligible share in the food spectrum of the buzzard and a maximum of 20 % in the food of the goshawk. Loss caused to poultry are negligible with both birds. Only the goshawk hunts to a larger extent domestic pigeons, but in no case is it specialized for hunting this bird.

80. KINTZEL, W.: Pflegemassnahmen in Naturschutzgebieten durch eine AGR "Sozialistische Landeskultur" im Kreis Lübz (Measures undertaken in protected areas in the district of Lübz by the "Socialist Landscape Concervation" hobby club)
Biologie in der Schule, 30, 1981, No. 11, pp. 460-461.
1 tab.

Among the important prerequisites for the successful activities of hobby clubs are their continuity, an alternation of various activities and participation in productive activities. The author deals especially with the latter, i.e. work on socially important tasks, which are a part of the hobby club's activities. The author describes his own experiences in this area.

81. KNIEP, W.: Pflege eines Naturschutzgebietes - gute Erfahrungen einer AGR. "Socialistische Landeskultur" (Care of protected areas - the positive experiences of the Socialist Landscape Conservation hobby club) Biologie in der Schule, 30, 1981, No. 11, pp. 456-459.

The author has for several years been the supervisor of this type of hobby club. Among its activities have been measures aimed at protecting the goshawk, which is also one of the purposes of having protected areas. Other activities concerned finding muskrats for the protected area. Muskrats in this particular area have the function of primary consumers in the water eco-system of a peat bog. Such relations are very important for ecological equilibrium and the pupils learn a great deal in this manner. The pupils fed additional food to the muskrats from autumn until spring (mostly beets, potatoes and left-overs of bread).

82. KONONOVA, S.D.: Metodika prepodavaniya temi "Okhrana prirodi i zapovednoye delo" v fakultativnom kurse "Vvedeniye v ekologiyu" (The methodology of teaching the topic "Nature conservation" in the elective course "An Introduction to Ecology")
Biologiya v shkole, 55, 1981, No. 2, pp. 51-57.

The author analyses in detail a unit of 5 lessons devoted to nature conservation and the assignments given to pupils. They include the following:

1. Nature conservation in the USSR:
- Show pupils the mutual links existing between man, society and nature.
- Explain the need to deal with problems of nature conservation on a government and international scale.
- Make clear the differences between the principles of nature conservation under socialism and under capitalism.

- Acquaint pupils with laws concerning nature conservation in the USSR.

2. The significance of protected areas:

- Acquaint pupils with the basic forms of nature conservation in the USSR.
- Explain the purpose and objectives of protected areas.
- Acquaint pupils with the most important protected areas in the USSR.

3. International cooperation and nature conservation:

- Explain the global nature of changes occuring in the environment.
- Explain the system of international recommendations and measures for environmental conservation.

4. Tourism and nature conservation:

- Explain the importance of tourism as a form of active leisure-time activity.
- Explain to pupils the rules of behaviour to be followed in outdoor tourist activities.

5. Organize a tourist hiking excursion (for pupils from the 7th class - approximately 20 km).

- Acquaint pupils with various natural phenomena they will encounter during the hike.
- Teach pupils the basics of movement and behaviour outdoors.

83. KREIPKE, S.: Umweltgifte und ihre Wirkung bei Pflanzen. Vorschläge für einen Experimentalunterricht in einer 7. Klasse (Poisons in the environment and their influence on plants. Suggestions for experimental teaching in the 7th class)
Der Biologieunterricht, 17, 1981, No. 4, pp. 69-95.
2 tabs.

The author points to an important component of education towards environmental conservation: acquainting pupils with poisons which pollute the environment and their influence on plants. These substance include gases, liquids and solid substances (such as sulphur dioxide, nitrogen oxides, chlorine, heavy metals, petroleum products, detergents and salt used for de-icing roads). Most of these substances pollute the environment in the course of chemical processes taking place in industry (for instance in the production of hydrochloric acid, nitric acid, in the making of synthetic fibres, producing metals and steel, in the desinfection of human environments, the use of internal combustion machines, in the transportation and processing of petroleum and in water treatment). The author describes the negative effects of these poisons, especially when they are cummulated and combined. The author recommends various observations and experiments of the substances mentioned above which have been verified and found to be suitable for school instruction.

84. KUKUSHKIN, G.Y.: Okhrana prirodi v sisteme planirovaniya i razvitiya narodnogo khozyastva SSSR (Nature conservation in the system of planning the development of the national economy of the USSR)
Biologiya v shkole, 55, 1981, No. 3, pp. 8-17.

An important precondition for the development of the national economy is the planned and rational utilization of all the state´s resources, especially the utilization of its natural wealth. For this reason the planning of measures in the area of nature conservation and the utilization of resources is an indivisible part of the national economic plan. The author cites specific measures taken in this area:
1. Conservation of the soil - only 27 % of the surface of the USSR is agricultural land and arable land repre-

sents only 10 %. It is important to protect the soil against erosion, prevent the use of fertile land for other than agricultural purposes and recultivate non-fertile soil.

2. Conservation of the forests - forests cover 34 % of the surface of the USSR, but they are not distributed evenly. The European part of the USSR has only 22 % of the total forest area. Also the forming of more protected areas is important.

3. Conservation of waters - increases in water use by industry must be slowed down, so that pollution of rivers and also of the Black and Azov seas is prevented. Planning the conservation of underground waters is also important.

4. Conservation of the atmosphere - especially decreasing air pollution by electrical power stations and factories. Electrification has a net positive impact on air pollution.

85. KVASNIČKOVÁ, D.: Průzkum informovanosti učitelů o životním prostředí (A study of the information available to teachers concerning the environment) Přírodní vědy ve škole, 32, 1980/1981, No. 8, pp. 285-287.

If education towards environmental conservation is to be effective, teachers above all must supplement their own education in this direction. If an information system concerning the environment is to be designed which would be suitable for teachers and educators, it is first necessary to determine what knowledge the teaching public has on this subject and from what sources their existing information has come from, as well as which information sources teachers consider to be most acceptable and accessible. A questionnaire was sent out to teachers in an attempt to find answers to these questions.

The article provides answers which were the outcome of this study.

86. MEBS, T.: Greifvogelschutz - ökologische Argumentation (Protection of birds of prey - ecological arguments)
Der Biologieunterricht, 17, 1981, Nc. 2, pp. 19-24.

It has been found that of 20 species of birds of prey which live in the FRG, 15 are onthe red list of threatened species, which is 75 %. The numbers of living birds of prey of some species have dropped very dramatically - by 90 %! For this reason the general protection of all birds of prey has been introduced in the FRG. The author describes in detail the characteristics of the flight of birds of prey and how the buzzard and the goshawk fly and hunt. Both these birds greatly differ one from the other. There are two types of hunters among goshawks - one concentrates on hunting birds, the other mammals. The goshawk usually hunts animals which are found in large numbers, such as pigeons, crows, jackdaws, rabbits, hares, etc. The common buzzard hunts mostly healthy individuals who weigh less than half a kilo, i.e. up to the size of a young hare. They also hunt small birds, reptiles and amphibians, but most of all,rodents. Birds of prey prefer to hunt weak, wounded or ill individuals, which they are able to distinguish very precisely by sight from healthy individuals. Thus their regulation has a qualitatively positive effect on the population of the its prey. The overpopulation of pests cannot bereduced by birds of prey, or owls or predators. The overcoming of overpopulated pests occurs only for internal reasons, never for external ones. The density of population depends on the supply of food available and is variable in the course of the year. The supply of food also influences the success of the birds´ nesting and rearing of young. The decline in the number of partridges is not caused by birds of prey, but by the fact that they have lost their nesting opportunities, that weeds have ceased to grow on fields or their vicinity and especially by the fact that fields have been combined into large units, without balks and various chemicals are extensively used as fertilizers, herbacides and insecticides. Also the number of hares living wildly has decreased because of the use of chemicals in agriculture, the widespread use of automobiles, tractors and harvesting combines, and also because of changes in the landscape. All this has led to a strong limitation or even destruction of suitable environments for a number of animals, including small game.

87. MOLDAN, B.: Čištění (Cleaning)
Přírodní vědy ve škole, 32, 1980/1981, No. 8, p. 290.

The term "cleaning" has a somewhat anthropomorphic connotation because waste or pollution has been introduced into the environment mainly by man. The waste which man produces can be gotten rid of in two ways. Either we can do away with the source of the waste or clean up the waste after it has developed, in those places where it is a nuisance or danger. An example of the former is a water treatment plant or the filtration of solid particles in waste gas. A definite solution will be brought about through wasteless technologies and closed cycle production. In conclusion the author discusses the devastation of the landscape.

68. MÜLLER, F.: Die Bedeutung von Rainen, Hecken und Feldgehölzen in der Landschaft - besonders für Wildtiere (The importance of balks, shrubs and field coppices, especially for wild animals)
Praxis der Naturwissenschaften- Biologie, 30, 1981, No. 10, pp. 289-300. 14 figs.

The author explains the ecological meaning of balks (ridges which divide fields), shrubs and field coppices and analyses in detail their structure and function. These areas besides serving the purpose of evening out small differences in the relief of the landscape also have an aesthetical function and are especially important from an ecological point of view, because they serve as the home of various faune which due to changes in the landscape brought about by human activity is losing its natural environment and food sources. The author describes food chains and food networks and on the basis of the specific example of a field coppice describes how wild animals looking for food find it. He mentions ants, the Thomisus albus spider and strike which come from a radius of 50 meters, the bufo frog and the weasel from a radius of 150 m, shrews from 200 m, hedgehogs from a radius of 250 m, polecats and stoats from a radius of 300 m and the marten and the fox from a radius of 1000 m. The author also discusses the reasons for a decline in the number of partridges. Balks, shrubs and coppices also provide protection against the frost and snowdrifts. In conclusion the plant species found in balks, shrubs and coppices are discussed and how care should be taken of them.

89. NI[illegible]EN, L.A.: The Case for Environmental Moderation
The American Biology Teacher, 43, 1981, No. 4, pp. 208-210.

Opinions expressed concerning environmental conservation sometimes border on the mystical. The author expresses his opinion against those who consider any exploitation of nature as something negative or who claim that any human activity which aims at changing the natural environment is bad. Changes which some ecologists now consider bad may very well be necessary and correct. What is needed is an awareness of damage which might be done and the will to stop in time, before serious damage is done or ecological equilibrium really lost. The government and its agencies are best suited to properly deal with environmental problems.

90. PECHA, M.: Chráněná krajinná oblast Křivoklátsko
(The protected landscape area of Křivoklát)
Přírodní vědy ve škole, 32, 1980/1981, No. 4, pp. 125-128.

A decree issued by the Ministry of Culture of the Czech Socialist Republic on November 24th, 1978 has made Křivoklátsko a Protected Landscape Area on a territory of 52 792 hectars. This area will have a total of 19 state nature reserves and protected natural artefacts. The purpose of this arrangment is the conservation of all values in a landscape, including the way it looks, its typical characteristics and natural resources. Among the typical characteristics of a landscape are its relief pattern, including waterways and water areas, its vegetation and wildly living fauna, the urbanistic pattern of its settlements, architectural buildings and local folk structures. This protected area is among those listed by UNESCO as a bio-spherical reservation within the framework of the "Man and the Biosphere" program. The problems encountered by the protected area are the same as those encountered by other similar cases. The interests of the State Administration for Nature Conservation to protect the area are often at variance with interests of organizations and institutions, as well as individuals who wish to become acquainted and use the area.At present two forms exist in which those interested in the natural science aspects of the area can become acquainted with it, while at the same time keeping the number of visitors within reasonable limits: the use of a scientific study trail and guided excursions. Both forms can be made use of by school groups.

91. PFEIL, H.: Ökonomie und Ökologie (Economics and ecology)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 2, p. 60.

At present the linkage which exists between economics and ecology has become more important, but has not recieved sufficient attention. This relation is not one of cause and effect, but rather a complex relationship typical of a cybernetic model. Small-scale changes on the one side can lead to large-scale disorders on the other. The author cites several examples. In the FRG in the period 1970-1974, 12.6 billion DM were extended by industry for protection of the air as well as 13.4 billion DM from public funds, but nevertheless the air over the FRG contains approximately 7 million tons of carbon dioxide, 5 million tons of sulpher dioxide, 3 million tons of hydrocarbons and 2.6 million tons of dust and soot. These substances pollute not only the air, but also the soil, lead to extended changes in flora and fauna and accelerate the erosion of the soil. Another consequence is the depletion of fossile fuel, an increase in its price and this in turn leads to far-reaching economic changes and changes in the structure of the economy. Increasing the output of chemicals and the building of new chemical plants leads to increased emissions and the further pollution of the environment. A decrease of underground water for drinking has occured as a consequence of the fact that surface water is increasingly polluted. But this leads to a general lowering of the watertable. In a similar manner de-forestation and the increased cutting of timber for the needs of the chemical industry also leads to the erosion of the soil.

92. REVINA, S.K.: Sistema kontrolya za sostoyaniyem okruzhayushchey sredi v SSSR (The system of inspection and control of the environment in the USSR) Biologiya v shkole, 55, 1981, No. 4, pp. 12-18.

In connection with the widespread use of large--scale technology for increasing the efficiency of utilization of natural recources, anthropogenic influences upon the environment have become more marked and some of them are having a global effect. For this reason it is necessary to form an information service, which would study and closely follow any changes occuring in this area and assess them. Such a system of observing and assessing the state of the environment is called a monitoring system, which makes it possible to prepare forecasts, which take into account both natural and man-originated factors. We should distinguish in this context:

Climate monitoring - which studies the state of the system, including the atmosphere, water, dry land, biota, etc.

Ecological monitoring - control and inspecti [illegible] changes taking place on Earth.

Some of the procedures used by the monitoring systems are also described in the article.

93. RIEDEL, W.: Die Bedeutung von Wallhecken für die Landschaft und ihre Bewartung mittels Schüllerkartierungen (The importance of hedgerows in the landscape and their assessment through mapping done by pupils) Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 10, pp. 301-312. 11 figs.

The article deals with the importance of hedgerows in the landscape, describes their historical development and the differences in their function previously and at present. Originally they served not only as protection against the wind and snowdrifts, but especially as the fences of meadows where cattle was grazing. They also provided protection against floods and were a source of fuel (in the form of wood for burning).The author then discusses their ecological importance, their economic contribution, their importance for maintaining threatened species of plants and animals, their function as the home of insectivorous birds and hence their contribution to combating pests and also their aestherical contribution. At present in the FRG, hedgerows are disappearing and for this reason endeavours are made to conserve them as components of the landscape. In 1981 in the Netherlands a law was passed concerning their conservation. In the FRG new hedgerows are being founded in the form of knicks, i.e. a ridge with shrubs and hedges, lined on each side by a narrow water trench. The author describes in detail the flora and fauna of knicks and stresses their importance in the landscape. Suggestions are given for independent assignments for pupils which can be prepared outdoors, during excursions. These include mapping hedgerows in the surrounding landscape.

94. SCHMIDT, K.: Erfahrungen bei der Erforschung und dem Schutz der Lurche durch Schüller (Experiences with the study and conservation of amphibians)
Biologie in der Schule, 30, 1981, No. 11, pp. 462-464.
15 photos.

Amphibians are among the most threatened species in central Europe. The most important cause of this situation is the pollution of water, together with land reclamation and drainage work and doing away with small ponds; all these factors accompany the intensification of agricultural production. The author first deals with amphibians as suitable objects for pupil study projects. Their advantage is that they are simple to find, to catch and to identify and that practically all species are useful and/or threatened. They are also easy to keep in an aquarium. They are not dangerous and their observation makes no great demands. The results achieved in this type of work done in a biology hobby club are described in detail by the author.

95. SCHULZ-KÖHNEL, U.: Vogelschutz im "Ökogarten"
(The conservation of birds in an ecological garden)
Praxis der Naturwissenschaften - Biologie, 30, 1981,
No. 8, pp. 228-235. 11 figs.

In the upper classes of secondary school pupils should become acquainted with basic ecological notions and should learn that human intervention into the existing eco-system can also lead to negative effects, which lead to disequilibrium in the eco-system and the disappearance of flora and fauna species. Birds for instance are an excellent indicator of how the eco-system suffers. The author discusses the possibilities of forming a suitable environment for birds in the vicinity of human settlements - in ecological gardens where priority is given to indigenous plants, shrubs and trees which provide birds with opportunities for building nests and provide them with food during the cold period. The cultivation of traditional gardens with exotic plants and shrubs does not provide birds with these opportunities, while a natural garden tries to reproduce the structure and composition of the wilderness. Such a garden will attract a large number of bird species, which do not compete mutually. The article contains a list of birds which will live in trees and shrubs, near the ground, etc., as well as a list of shrubs for hedges, trees on which insects live (which provide birds with food) and a list of birds which build their nests in different parts of trees and shrubs.

96. STEINBACHER, J.: Greifvogel und Gift (Birds of prey and poison)
Der Biologieunterricht, 17, 1981, No. 2, pp. 25-29.

Since the middle of the fifties there is a clear worldwide decrease in the population of various species of birds of prey. This decrease has now also affected other bird species, such as storks, herons, marine birds and recently even song birds. Books concerning this subject (for instance R. Carson: The Silent Spring and E. Berzel: Verstummen die Vögel ?) have begun to appear and also first scientific projects which have shown the consequences of the wide-spread use of biocides, especially herbacides and insecticides especially for birds of prey and other birds. Due to these abnormalities in the environment birds of prey have changed their mating and nesting behaviour, as well as their behaviour in protection of their nesting territory. The number of eggs in nests have decreased, as have the numbers of young reared. Larger numbers of embryos die and eggshells are thiner, thus providing less protection. In many cases birds of prey are entirely unsuccessful in their nesting efforts. The use of modern chemical analytical methods and especially the use of gas chromatography have led to the speedy diagnosis of these phenomena, which have been found to be the outcome of the increased use of chemicals in agriculture, especially insecticides. These substances are soluble in fats, they accumulate in the bodies of birds of prey in their body fat and during periods of hunger (in the autumn and before spring) they are assimilated and cause poisonings, which affect the liver, kidneys, heart and brains and often cause very rapid death which previously was not understood. In other cases changes in the blood composition of birds of prey takes place, nerves are damaged and cramps occur and even chromosomal defects leading to physical and mental defects and abnormalities (albinotic birds, birds with deformed feet) have been recorded. The main guilty factors are chlorated hydrocarbons and semi-chlorated bi-fenyls - as has been proven by thorough analyses of dead birds and of pathological eggs, done in the FRG. Birds of prey which have a very broad spectrum of food (for instance kites), or eat mainly small rodents (the kestrel) have, on the other hand, greatly increased in numbers. Thinner egg shells have been found both in the FRG and in the USA. In Sweden damage caused by heavy metals which find their way into the environment have been observed, especially by cadmium and mercury.

97. TREITZ, P.: Was dem geplanten Autobahnzubringer alles zum Opfer fallen wird: Gelbbauchunken und Kreutkröten Naturschützer retteten bedrohte Amphibien aus ehemaliger Tongrube (What will have to be sacrificed for the planned extension of highways: The midwife toad and the bufo frog. Nature conservationists save threatened amphibians from a former clay pit)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No.8, pp. 253-254. 1 photo.

In central Europe 30 % of all spermatophyta and 40 % of all vertebrates are threatened; they have come to the border of extinction during the last 50 years. The author points to important changes which have occured in the FRG as a consequence of the proliferation of automobiles, the building of canals and large-scale construction in general. In the Saarland, in the vicinity of the town of Neunkirchen, nature conservationists are working hard to maintain the amphibian population in the landscape. The author describes the life, behaviour, mating habits and reproduction of two frogs, the midwife toad (Bombina variegeta) and the common frog (Bufo bufo), which due to the work of people now have a chance to survive in spite of the dense settlements and construction activity in this area.

98. TVRDÍK, J.: Ekologie a výchova k péči o životní prostředí v osnovách a učebnici v 6. ročníku základní školy (Ecology and education towards environmental conservation in the teaching syllabus and textbook for the 6th class of basic school)
Přírodní vědy ve škole, 32, 1980/1981, no.10, pp.362-367.

The textbook Nature Studies for the 6th class provides ecological information in the context of morphological, t[illegible]nomical, hygienic and other sections. The

90

teacher should separate and put together all parts concerning ecology and add generally valid ecological laws. The purpose of the article is to help the teacher to do this. The author describes various abiotic factors (light, heat, the air and atmospherical phenomena, water, the soil). He then discusses biotic factors (food and the nutrition of animals, the individual as part of the population, relations between various organisms within a community). The mutual relations existing between populations of two species can be made clear on the basis of a diagram. In conclusion the author briefly describes the flow of matter and energy in living systems. To this is added a diagram of a natural grazing cycle.

99. WESSEL, V.: Greifvogel und Eulen - ökologisch gesehen
(Birds of prey and owls - an ecological view)
Der Biologieunterricht, 17, 1981, No. 2, pp. 5-18.

Birds of prey and owls can serve as bio-indicators of the landscape in ecology. No other animal specie reacts to such an extent to the use of insecticides and herbacides. This is because birds of prey and owls are very near the top of the food chain or food network and the poisonous substances from lower levels of the chain or pyramid accumulate in their bodies and have a negative effect on them. Since the sixties the number of birds of prey and owls in the FRG, as well as in surrounding countries has been declining, without any adequate reaction on the part of nature conservationists and environmentalists. Birds of prey and owls as the highest regulators in the radius of their activity are thus the best indicators of a still healthy eco-system. It is only at present that the all-out protection of birds of prey and owls has been implemented. In a natural eco-system there is a state of equilibrium between birds of prey and owls on the one hand and their prey on the other. No bird of prey has ever caused the extinction of its prey. The tasks of school in this context should be to acquaint pupils with birds of prey and owls found in their region, with their way of life and role in the eco-system. It is also important to explain that their role as killers of small microtines is very important. An analysis of the pellets of birds of prey and owls (as well as those of crows, the Blue-grey heron, gulls and the kingfisher) convincingly show the service which these birds provide to agriculture and forestry. Schools should also acquaint pupils with measures aimed at increasing, or at least maintaining existing numbers of these animals; some of these measures can be taken by schools or in the course of extra-curricula activities. During hard winters the author recommends feeding owls, but since the majority of owls will not take food which is no longer alive it is possible to feed owls by leaving them a small pile of straw, where mice and microtines will come of their own accord, thus providing the owls with an opportunity to hunt them out there. Some of the activities for saving birds of prey and owls have been successful in the FRG, for instance measures to save the eagle-owl and the falcon.

100. WESSEL, V.: Unterrichtsmöglichkeiten und Projekte zum Thema "Greifvogel und Eulen" (Teaching opportunities and opportunities for projects on the topic "Birds of prey and owls")
Der Biologieunterricht, 17, 1981, No. 2, pp. 41-49.

Birds of prey and owls are encountered in a number of various topics taught at various types of schools -

in the context of morphology, anatomy, general biology, as well as ecology, for instance in connection with food chains, population density, nesting, food territory, etc. Pupils can be motivated for instance by an interest in heraldry, numismatics, stamp collecting, literature and folk tales, as well as forestry and game-keeping. Birds of prey and some owls can be observed during excursions and hikes and at summer camps. Outdoors, pupils can look for pellets, feathers, nests and the remnants of prey. In class, a live bird of prey or owl might be shown or a stuffed animal. The author provides interesting information about various activities undertaken by schools for saving birds of prey and owls, especially in the course of hard winters (such as in 1979). In some schools pupils feed owls with small microtines (4200 mice) which were offered to the owls in heated tubs. Other schools placed small piles of straw in fields or meadows to which microtines and mice came. Some schools built perches for buzzards in fields or meadows. Also special bird-boxes for owls were built in the vicinity of schools. For instance the Barn owl needs a bird-box 1m x 0.5 m x 2 m in size.

101. JURČÁK, J.: Naučná stezka Javorníky a její výchovně vzdělávací využití-I. (A science trail in the Javorníky mountains and its teaching and educational utilization. I.)
Přírodní vědy ve škole, 32, 1980/1981, No. 5, pp. 168-171.

The author of the article describes a new science trail in the Javorníky mountains, which has been organized within the Protected Landscape Area of the Beskides Mountains and provides a brief characteristic of the natural conditions found in the Javorníky mountains and along this science trail. The orographic unit of the

Javorníky mountains, which are a part of the Moravian and Slovakian Carpathian subsystem and the outer Western Carpathian system, belong to the outer arch of the flysch Carpathians. From the point of view of the climate this region belongs to the colder temperate zones. The variability of altitude is characteristic for their relief. From the point of view of the phyto-geographical division of Czechoslovakia, the flora of the Beskides belongs to the Western Slovakian region. From a zoo-geographical point of view the fauna of this region is part of the Palaearctic faunistic region and is part of the Euro-Siberian sub-region. This is the place where its two parts - the zone of deciduous forests and the steppe zone - meet. The Javorníky mountains thus are characterised as a transition between east and west. The author also cites some typical representative of flora and fauna in this region.

102. JURÁČEK, J.: Naučná stezka Javorníky a její výchovně vzdělávací využití - II. (A science trail in the Javorníky mountains and its teaching and educational utilization - II.)
Přírodní vědy ve škole, 32, 1980/1981, No. 6, pp. 204-205.

The author describes the course of the science trail in the Javorníky mountains and continues in a discussion of its best teaching and educational utilization. During excursions its geological, biological and geographical aspects should be taken into account. But also various aspects which belong to the context of the social sciences should be taken into account (history, civics). In this aspect, this particular trail differs from others, which are usually interesting only from a natural science point of view.

6.88 Health-care education in biology instruction

103. BINDER, K.: Psychologische Aspekte zahnmedizinischer Prophylaxe (The psychological aspects of provention in dental medicine)
Der mathematische und naturwissenschaftliche Unterricht, **34**, 1981, No. 7, pp. 428-432. 3 figs.

The author discusses the psychological aspects of preventive dental medicine. He stressed the unsatisfactory results achieved in health-care education in this area, which he explains on the basis of a psychological surpression mechanism. He considers suitable motivation for proper prevention of dental disease and the training of suitable skills is caring for teeth. He points to an interesting fact, that often fear is used as a motivating factor. The role of parents and kindergarden school teachers is very important in this context, because pre-school age children can best be influenced to form a correct attitude towards medical care and visits to the dentist. From a psychological point of view, fear which arises in a child or adult in the course of actual or seeming danger, is very important. From birth to death every person is constantly threatened by various dangers. But the predominant part of these dangers are not acknowledged. However, specific mechanisms must remain alert in case acute danger develops and this requires an awareness of impending danger. The borderline between overlooking danger and being aware of it is individual and can have pathological forms (persons taking exaggerated risks, psychopaths, hypochondriacs). Fear is also the cause of every neurosis. The author analyses the causes of fear of a dentist in children. He cites the course of an experiment where various types of motivation for taking care of teeth and cleaning them properly were tried. In one experiment methods were used which caused severe fear in children. The findings, however, indicated that this type of motivation did not have such a long-term effect as an experiment in which only an adequate amount of fear was used. The author also calls attention to some wrong ideas concerning care of the teeth, such as the problem of fluorization, where some people have made the silly claim that the use of fluorization substances leads to cancer.

104. BOHME, I.: Zum aktuellen Thema (Concerning a current problem)
Biologie in der Schule, 30, 1981, No. 4, pp. 163-164.

The education of a generation for which a rejection of smoking will become a typical standard of behaviour cannot be achieved by mere forbidding, but only by achieving an awareness of the situation which can then be reflected in adequate behaviour. School should play the main role in this context. However, existing contradictory influences must first be overcome (for instance the smoking of teachers, smoking seen in films, etc.). Also cooperation between school and the family is of great importance.

105. DRANSFELD, K.: Humangenetik und Gesundheitserziehung (Human genetics and helath-care education)
Biologie in der Schule, 30, 1981, No. 4, pp. 153-160.
5 figs.

The fact that different people react in different ways to various environmental disorders can be explained on the basis of genetic dispositions. The genetic aspect of disease should be stressed especially in the 10th class, in the topic "Human genetics". The author goes on to provide a survey of genetic disease, which include phenylketonuria, schizophrenia, diabetes, hypertention and asthma. Next he deals with the prevention of genetic disease (for instance Down's syndrome) on the basis of decreasing the number of mutations. A comparison of infectious and genetically caused disease can be undertaken in the 10th class.

106. GRAUS, A. - KOSORINOVÁ, D.: Vplyv prostredia na návyk fajčenia dorastajúcej mládeže (The influence of the environment on the habit of smoking among adolescent youth)
Přírodní vědy ve škole, 32, 1980/1981, No. 5, pp.173-174.

The article discusses factors which lead young people to smoke. Its aim is to contribute to overcoming this negative habit among young people. The authors administered a questionnaire to 339 students in general education secondary schools and pupils in apprentice training centres where they were asked questions about the situation in which they began to smoke. Only a small percentage of the students gave positive answers to the question of whether smoking is harmful to health. In non-smoking families the percentage of smoking children is smaller than in smoker families. Boys smoke more regularly than girls, but occasional smokers later usually become regular smokers. During school attendence the number of cigarettes smoked daily is small, usually 5. The majority of smokers said they began to smoke under the influence of their peers. One fifth of the respondents began to smoke in the pre-puberty period. Approximately half the parents of the respondents know about the fact that their children smoke, while the other half does not. 40 % of the respondents said that school instruction has not attempted to do anything against their smoking habit.

107. HAHN, M.: Rauchen - schulische Möglichkeiten der Prophylaxe (Smoking and the opportunities for its prevention in school)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 6, pp. 161-168. 5 figs., 1 picture table.

Firms producing cigarettes and selling them through sophisticated advertising also have an influence on young people. For this reason schools should preventively influence them in the opposite direction and devote attention to this problem. The age at which children begin to smoke is constantly declining; for this reason the best age at which to begin with anti-smoking propaganda is in the 6th class; among older pupils the role of the teacher is much more difficult, because he or she has to deal with overcoming a habit which is often already formed. In biology teaching, when the topic "respiration organs" is being studied within the framework of health education, pupils should be acquainted with the risks attached to smoking. Of 11 people who die of cancer of the lungs, 10 are smokers. The majority of the 10 to 20 000 annually amputated legs in the FRG belong to smokers (Buerger's disease). In the FRG cigarette makers devote 140 million DM to advertisments annually and expenditures for tobacco products are equal to 14 billion DM annually. It should be pointed out that advertisments show smokers as healthy smoking people, whereas the truth is different. Of course teachers who wish to influence pupils in this context should stop smoking themselves. The author deals in detail with two teaching lessons devoted to this topic and stresses their cognitive, affective and instrumental objectives, describes their motivational stage, the seeking of solutions to problems and a summary of the lesson, where pupils learn that cigarette smoke is composed of 600 different components, the most important of which are tar, nicotine, hydrogen cynide, carbon monoxide, phenols, ammonium and the radioactive tracer element Polonium. In the lesson, the author recommends stressing the influence of tar, the paralysis of the cilial epithelium of the respiratory organs, the acumulation of tar in the lungs, "smokers' cough" and the damage done to the lungs.

108. HEICHEL, G.: "Rauchen - ein soziales Übel ?" (Is smoking a social evil ?")
Biologie in der Schule, 30, 1981, No. 5, pp. 212-214.

Even if pupils know about the evils of smoking, their behaviour is often not in accord with this knowledge. However, education towards leading a healthy life is not only the problem of the school system, because outside school pupils find many examples of people smoking. Three contradictions exist in relation to smoking: The first can be found in the fact that the teacher himself smokes, the second in the fact that many physicians smoke and the third in the very fact that cigarettes are produced. If smokers were isolated and not allowed to offend others with their smoking and a change in public opinion occured where the rejection of cigarettes was considered to be a positive standard of behaviour, then the extent of smoking might actual decrease.

109. HEINZEL, I.: Können Raucher zum Nichtrauchern erziehen ? (Can a smoker educate towards a rejection of smoking ?)
Biologie in der Schule, 30, 1981, No. 5, pp. 211-212.

It is commendable that pupils' knowledge concerning the negative effects of smoking is increasing. However, this is not sufficient to assure responsible behaviour of pupils in this respect. A rejection of smoking can be achieved only through conviction and on the basis of knowledge, but not on the basis of forbidding. The teacher plays an important role in this context. The endeavours of a teacher in this direction are usually unsuccessful if the teacher himself is a smoker. Many pupils begin to smoke out of curiosity, to imitate others and to avoid the ridicule of peers. Thus we should strive to make the rejection of cigarettes something attractive and also to provide meaningful leisure-time activities.

110. KELLER, H.: Die Kohlendioxidkonzentration im Klassenzimmer, ein wichtiger Umweltfaktor für Lehrer und Schüler (The concentration of carbon dioxide in the classroom. An important environmental factor for pupils and teachers)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 7, pp. 208-209. 2 figs.

The article provides information on the content of carbon dioxide in classrooms in the course of a weekday, from 8 A.M. to 1 P.M. and how this can be measured. Changes in CO_2 content can be measured and relevant conclusions drawn. In the course of the day not only the carbon dioxide level changes, but also the quantity of both good and bad smells, the composition of the air, the water vapour content, dust particles, the quantity of microorganisms in the air, its temperature and others. In nature the concentration of carbon dioxide in air does not exceed 0.033 %. In the classroom the maximum acceptable carbon dioxide content is 1 % with a maximum concentration of 0.5 ppm. After 2 teaching lessons the concentration reaches its maximum (depending on the ventilation in the classroom and the number of pupils). If the windows are closed, the quality of the air rapidly deteriorates. Openning the windows during breaks is not sufficient; to achieve good quality air the windows would have to be openned very 15 minutes for a period of 7 minutes. In the winter it would be very difficult to maintain proper temperatures. When it is cold outdoors the period of ventilation can be shorter because when a window is openned the exchange of air is more rapid as a consequences of the differences in temperature indoors and outdoors.

111. LÖTHER,R.: Dimensionen menschlicher Gesundheit und Krankheit (The dimensions of human health and disease) Biologie in der Schule, 30, 1981, No. 6, pp. 248-254.

The concept of health and disease are both manifestations of organismal life which mutual preclude each other, while at the same time no clear borderline between them exists; both are manifest in different characteristics of the living organism and its relation to the environment. The relation between health and disease should be assessed in its dialectical unity between the biotic dimension on the one side and the social and mental dimension on the other. The biotic dimension is based on the fact that organisms are complex material systems and that health and illness are as old as life itself. The more complex an organism is, the greater the likelihood of illness and the more complicated the disease. The key to understanding the essence of disease is the concept of homeostasis, which the author deals with in detail. In disease, homeostasis is disturbed. The health and disease of a person depends on a number of factors, among which social conditions are of great significance. Here it is necessary to take the following aspects into consideration: the importance of disease from the point of view of society depends of the frequency of its incidence. Social conditions influence the disposition towards disease and a disease makes its appearance under specific social conditions. In this context the author discusses the typical diseases of the present. Mental dimensions are in the nature of a mediator between the biotic and the social aspects. In conclusion the author deals with the importance of modern medicine.

112. McALLISTER, M.: Microwaves and Radio Waves
The Science Teacher, 48, 1981, No. 3, pp. 25-27. 4 figs.

The large-scale use of various appliances based on microwaves and radio waves after World War II has led the public to voice fears concerning the damaging influence of these waves upon the human organism and their penetration into living tissues. If we take into consideration the fact that in the USA more than 35 million electromagnetic, heating and drying mechanism are at work in industry, as well as more than 10 million microwave ovens, over 30 million radio sets and 20 million radar instruments, then we can understand the reason for this apprehension. The author informs readers about microwaves and radio waves, their negative effect on biological organisms and how people can protect themselves agains their adverse effects. This detailed information is aimed at use in class.

113. MOSZNER, K.: Zum aktuellen Thema (Concerning a current topic)
Biologie in der Schule, 30, 1981, No. 4, pp. 162-163.

In the author's opinion, pupils have sufficient knowledge concerning the dangers inherent in smoking, but this knowledge does not lead to their adequate behaviour. One of the causes of this situation is the fact that many teachers, principals and physicians smoke (the author documents this on the basis of his own experiences). Commands are usually ineffective, the model provided by the educator is, however, of great importance.

114. NOVÁK, T.: Jak v protikuřácké výchově ? (How to continue in anti-smoking education)
Přírodní vědy ve škole, 32, 1980/1981, No. 4, p. 131.

Smoking is a negative habit which to a great extent threatens the health of the population. The majority of authors stress the fact that people are beginning to smoke at an increasingly young age. Between the ages of 15 to 19 almost half the population are smokers. In spite of all endeavours, we are unsuccessful in the gradual surpression of smoking addiction. The traditional approach to the problem is based on the use of health-care arguments. In the author's opinion this type of education is ineffective because it is based on instilling fear and causing tension in the receiver of the information. The first prerequisite for successful anti-smoking education among young people is explaining to them the reasons why this type of addiction develops. Information concerning the negative effects of smoking should be limited to health-care reasons. The teacher should continually react to the fact that his pupils are smoking and at every suitable occasion. Also the teacher himself should not smoke.

115. SCHMIDT, F.: Prävention des Rauchers al tegrierender Bestandteil der Gesundheitserziehung in Schulen (The prevention of smoking as an integrated component of health-care education in school)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 5, pp. 153-156.

The author here presents the findings obtained on the basis of the largest ever questionnaire project concerning smoking organised in the FRG (with a total of 9000 pupils). The findings of the project indicate the constantly increasing number of smokers among school youth and the fact that constantly younger age groups are smoking. On the basis of these finding the author comes to the conclusion that education against smoking in schools should be strengthened, with the aim of also preventing those who do not smoke from doing so. The author makes a total of 12 recommendations for measures aimed at protecting pupils against this type of addiction. It is important to acquaint pupils with civilizational diseases, which are becoming the most important cause of death. Smoking is now considered to be the most important aggrevating factor in this context, more important than alcoholic bevereges and drugs. For every 100 dead non-smokers there are 160 dead smokers. In the FRG 140 000 smokers die a premature death annually and another 100 000 become premature invalids. 40 % of all smokers have pulmonary cancer.

116. STRONCK, D.R.: The Surgeon General's Request for Nutrition
The American Biology Teacher, 43, 1981, No. 5, pp. 278--279 and 283.

The author comments the fact that the Surgeon General of the USA, in his report on health support programs and those aimed at the prevention of disease, requests that secondary schools, within the framework of teaching general biology, also provide instruction on nutrition. This of course means that biology and chemistry teachers must themselves first have sufficient knowledge in the area of nutrition. In the report, the Surgeon General also requests the forming of a uniform terminology in nutrition and that students learn to understand this terminology. This is one way in which to prevent, among others, mental confusion, forgetfulness, impatience, depression, fatigue and headaches which so many people tend to suffer from in the morning because of a poor breakfast. Nutritional theory is a neglected field, in spite of the fact that it is so important for the healthy life of the individual.

117. ŠLÉGL, J.: Studium a životospráva (The regimen of students)
Přírodní vědy ve škole, 32, 1980/1981, No. 8, pp. 283-284.

The article deals with some of the biological aspects of learning. Students should become acquainted with the principles of correct learning methodology. Within the framework of biology, this subject-matter should be dealt with in the context of hygiene and problems connected with an optimum daily regimen, which are a taught in the 4th class of general education secondary schools. Among the main factors which influence healthy learning are the following:

1) suitable alternation of work and periods of rest (after a half hour of maximum concentration a depression of mental activity takes place);

2) nutrition (mental and physical activity are supported especially by a sufficient quantity of proteins; the quantity of food a person should eat is determined by his work metabolism);

3) daily rhythm of performance (during the day there are usually two periods when a person's performance increases - often from 7 to 10 A.M. and from 5 to 8 P.M.)

4) conditions provided by the environment (adequate lighting, heat, fresh air, etc.)

5) the use of analgetics and other drugs for "improving" memory should be discouraged.

6.89 Sex education in biology instruction

118. DYLLA, K.: Problemfeld Sexualität (The problem field of sexuality)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 2, pp. 33-34. 3 figs., 1 tab.

The author points to the possibility of using the topic "sexuality" in biology teaching and has himself verified his recommendations in the course of two teaching lessons, which had the form of problem teaching. The pupils used a dictionary of the natural sciences, as well as other handbooks, where they read entries on various subjects connected with the field of sexuality. They classified what they read according to various criteria. By comparing entries, a number of problems arose, which the pupils then attempted to solve together. Sexuality was dealt with from 6 different points of view: sexuality in an erotic connotation, sexuality as differentiation of cells, sexuality as an instinct, sexuality as a behavioural pattern, sexuality as a non-specific basic need, sexuality as communication with another person. In conclusion the author discusses the advantages and drawbacks of this system of instruction.

119. CHASSIN, G.: Enquéte sur l´education et l´information sexuelles (A questionnaire concerning sex education and information)
Biologie, Géologie, 68, 1981, No. 4, pp. 837-858.

In 1980 a large-scale questionnaire project was organized concerning sex education in secondary schools; the respondents were teachers who are members of the French Association of Biology and Geology Teachers. The questionnaire were processed and analysed by the author in deat detail. The tables and the comments which accompany them allow the reader to become acquainted with the opinions of teachers concerning sex education in schools, as well as the opinions of parents and the school authorities. The design of the questionnair , which is also described, is very interesting.

120. KHRIPKOVA, A.G. - KOLESOV, D.V.: Gigienicheskoye i polovoye vospitaniye ushashchkhsya obshcheobrazovatelnikh shkol (The hygiene and sex education of pupils in general education schools)
Biologiya v shkole, 55, 1981, No. 6, pp. 42-47.

The new course of hygiene and sex education is part of the curriculum in the 8th class and is now being experimentally verified in selected schools. This course continues in what pupils have already learnt in anatomy, physiology and hygiene. Supplementary problems are the subject of 9 lessons and 8 lesson are devoted to new subject-matter. The article deals with the first 5 topics: Instroduction, The skeleton and muscles, Blood circulation and respiration, The struggle against epidemics, Nutrition.

121. KADURINA, E., GEORGIYEVA, P.: Polovoto vzpitaniye na uchenitsite chrez obucheniyeto po biologiya v osmi klas (Sex education of pupils in biology instruction in the 8th class)
Biologiya i khimiya, 24, 1981, No. 1, pp. 42-45.

Correct sex education, which contributes to the healthy sexual and moral development of youth, is a part of communist education in the socialist school system. The task of biology teachers is to acquaint pupils with the anatomy and function of the human sexual organs and to explain factors which influence the mental development of pupils in this context. In the new biology textbook for the 8th class there is a chapter on human reproduction, which is divided into the following four topics: 1) the structure and development of the sexual organs, 2) fertilization and the development of the embryo, 3) the development of the human after birth, 4) hygiene of the sexual system.

The textbook makes it possible for the teacher not only to provide pupils with basic instruction concerning physiological processes which are connected with the sexual life of the individual, but also to have an educational influence on pupils, which assumes experience and pedagogical tact on the part of the teacher and good relationships between him or her and the class.

122 LIBER, S.G. - TATUM, M.L.N.: Sex Education in the Biology Classroom - an Evaluation by Parents and Faculty
The American Biology Teacher, 43, 1981, No. 3, pp. 141--143, and 146. 4 tabs.

The sex education taught in the majority of American schools has been encountering mixed reactions on the part of parents, as well as the media. The authors here assess a program of sex education and education towards parenthood and publish the findings of a study designed to show how sex education is assessed by parents and school authorities. The data indicates that in spite of a positive attitude towards sex education, there is still a great deal of embarassment concerning some problems. In the future it will be necessary to firmly establish sex education in the curriculum of the upper classes of high schools.

123. TUNNICLIFE, S.D.: Sex Education or Birth Education ?
Naturel Science in Schools, 19, 1981, No. 1, pp. 7-9.

Sex education and birth education are terms which are often mutually interchanged. However, birth education concerns the origins and development of every living organism, whereas sex education concerns a sum of instructions concerning the reproductive organs and their function. In sex education such problems as what the outcome of sexual intercourse can be, including reproduction, the development of disease, contraceptives, etc. are dealt with. The author analyses both these topics and cites some studies done by outstanding sexologists. The article also contains instructions on how to proceed in sex education and how to deal in a tactful manner with problems of human reproduction.

124. WAGNER, K.D.: Pubertale Reifeauffähigkeiten und schulische Leistungsfähigkeiten (Pubescent sexual capacity and school learning ability)
Biologie in der Schule, 30, 1981, No. 6, pp. 260-266.
2 figs.

School learning ability depends on a number of biological, social and psychological factors. In the interaction between internal and external factors, the resulting reaction is not only the outcome of external influences, but can change due to internal conditions. The mental performance of people depends on their knowledge, abilities, etc. and is also co-determined by biological, mental and social maturity. The author first describes the pubescent period and then discusses the school learning ability of children who are non-synchronically developed or retarded. He shows that the best performance is achieved by those who are developed in a synchronic manner, as well as those with accelerated development. Also various functional disorders during puberty are discussed, such as coronary disorders, metabolic difficulties and motor agitation. In conclusion the author cites the findings of a project to determine school achievement among girls with vegetative type circulatory disorders.

125. ZUPANC, G.K.H.: Zur Plastizität des Sexualverhalten bei Primaten und beim Menschen (On the flexibility of sexual behaviour in primates and man)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 2, pp. 44-52, 4 figs.

The article informs the reader on the findings of a large-scale research project concerning the flexibility of sexual behaviour in primates and humans. As far as humans are concerned, the article deals especially with the influence of the female cycle on sexual readiness, analyses masturbation and homosexuality and their consequences. It also discusses sexual disorders in humans and distinguishes instinctive sex drives and those which are acquired and which are of great significance both in humans and animals.

6.9 Educational and vocational guidance in biology instruction

126. ZLATEVA, M.: Povishavane efektivnosta na uroka biologiya chrez profesionalna nasochenost (Increasing the effectiveness of biology lessons with the help of vocational guidance)
Biologiya i khimiya, 24, 1981, No. 3, pp. 52-54.

The author demonstrates how biology subject-matter, found in the biology teaching syllabus for the 5th and 6th classes, can also include interesting information for pupils concerning practical agriculture and thus improve the effectiveness of biology instruction. In the 5th class the topics "Plant conservation and forming of fruits and seeds" can serve this purpose. In the 6th class such a topic is "Parasites of humans and animals". Information on agriculture and veterinary work are interesting for pupils and help them to remember what they have learnt.

6.91 Education towards parenthood in biology instruction

127. SLATER, P.J.B.: Baby Knows Best: The Psychology of Pregnancy and Lactation
Journal of Biology Education, 15, 1981, No. 1, pp.8-12.

The relationship between a mother and her baby in the period between fertilization and weaning, i.e. the period of pregnancy and breast feeding, are studied by the author from the point of view of the embryo and baby. Already in early pregnancy the embryo influences the mother's physiology, which undergoes specific changes. After delivery the mother's physiology continues to undergo changes and is deeply influenced by the behaviour of the baby, especially in breast feeding. The requirements of the baby regulate the quantity of maternal milk. In this way the child controls the physiology of its mother in a manner similar to the influence of parasites, from the beginning of breast feeding up to its weaning. During this period a number of basic biological principles can be studied and explained on the basis of this example.

6.93 Education towards defence training in biology instruction

128. FLEISCHER, J.: Wechselseitige Beziehungen zwischen Zivilverteidigung und Biologieunterricht (Mutual relations between civilian defence and biology instruction) Biologie in der Schule, 30, 1981, No. 5, pp. 198-201. 1 fig.

One of the tasks of biology teaching is to help in the implementation of elements of education towards defence of the motherland. On the basis of the author's own experience in teaching civilian defence in the 9th class, two examples are cited on how to utilize mutual relations between both subjects: The first concerns instruction in the 8th class on the topic concerning first aid and the hygiene of blood circulation. The author cites partial teaching objectives and the opportunity to use various teaching media. The second example concerns the topic civilian defence in the 9th class; its analysis is similar to the preceding example.

129. MATZKE, M.: Beitrage zur sozialistischen Wehrerziehung im Biologieunterricht (A contribution to socialist civilian defence in biology instruction) Biologie in der Schule, 30, 1981, No. 5, pp. 194-197.

The use of civilian defence elements in biology teaching concern above all two teaching lessons concerning the topics "The Importance of Biology", taught in the 10th class. In this context the use of herbacides can be discussed (the author provides a bibliography of suitable texts and illustrations) and the dangers posed by biological warfare. In the second part of the article the author discusses the use of biological media for war in the past (for instance the spreading of smallpox epidemics among Indians, the use of the carriers of cholera, typhus and the plague by the Japanese against the Chinese in Mongolia, experiments done by the Fascists in concentration camps and the use of germ warfare in Korea, etc.

7.13 Problem teaching

130. BOGDANOVA, B.K. - KOBZAR, R.A.: Primineniye problemnogo podkhode pri izuchenii roli belkov v kletke. (The use of a problem approach to the study of the importance of protein in cells)
Biologiya v shkole, 55, 1981, No. 4, pp. 37-41.

The author describes in great detail how to proceed in the teaching lesson dealing with the importance of proteins in the cell and enzymes, which is taught in the 10th class.

The lesson has 6 didactical stages:

1) recall of pupils´ existing knowledge (discussion with whole class);
2) motivating pupils´ learning (exposition);
3) acquainting pupils with new material (exposition + discussion);
4) experiments done by pupils - the cleavage of hydrogen peroxide in Amaryllis cells (observation under microscope);
5) a study of other protein functions - generalizations (discussion + demonstration experiment)
6) conclusion of lesson and assigning homework.

131. TSAVREVA, G.: Aktivizirane poznavatelnata samostoyatelnost na uchenitsite chrez szdavane na sistema ot problemi sitatsii pri temata "Analizatori" po anatomiya i fiziologiya na chloveka (The activization of pupils' independent cognition with the aid of a system of problem situations in the topic "Analysors" in the anatomy and physiology of man)
Biologiya i khimiya, 24, 1981, No. 1, pp. 46-53.

The methodological analysis of the topic "analysors" begins with a discussion of the term "analysor" and introduces pupils to seeking a solution to the problem of how the human organism immediately reacts to changes in the external and internal environment and how it adapts to these changes. Individual analysors or sensors are then expained both from an anatomical and functional point of view. Each lesson is followed by various questions concerning the problem and concern the relation between sensory terminals in various organs and brain centres where the relevant sensory perception occurs.

132. GEORGIYEVA, P. - MILUSHCHEVA, E.: Problemniyat podkhod pri obucheniyeto po biologiya v osmi klas (A problem approach in biology teaching in the 8th class)
Biologiya i khimiya, 24, 1981, No. 4, pp. 19-21.

The basic problem which is experimentally dealt with in the 8th class, is the relationship between the human organism and the environment; the topic is called "The Human Organism as a Complex System". It is based on the following assumptions:

1) The nervous system is of special importance for maintaining equilibrium in the human organism.

2) A relationship probably exists between all the cells in the human organism and this relationship assures internal unity.
3) The human organism constantly excludes substances it does not need into the environment.
4) With the aid of the circulation system the relationship between cells, tissues and organs is implemented and this makes possible the regulation of living processes.

The authors here develop a number of assignments for giving to pupils which concern such problems as "Describe how the human organism has adapted and developed mechanisms for the transportation of nutrients and oxygen and how these substances are utilized by cells." The pupils step by step arrive at correct answers, make use of the knowledge gained previously and draw independent conclusions.

133. TERZIYSKA, I.: Problemen podkhod pri razkrivane na mirogledni ideyi v obucheniyeto po biologiya v peti klas (A problem approach in clarifying worldview problems in biology instruction in the 5th class) Biologiya i khimiya, 24, 1981, No. 6, pp. 38-46.

A worldview is a system of ideas and notions concerning the surrounding world. The task of forming in pupils a correct worldview is accomplished above all by teaching them basic scientific knowledge. This does not, however, mean that learning a specific amount of biological knowledge forms in itself a scientific worldview. It is necessary to guide pupils towards it gradually, so that they are able to draw their own conclusions. From this point of view the author analyses some of the topics from the botany syllabus for the 5th class and for each topic she has prepared a set of questions and assignments, which the pupils solve independently. The aim of this procedure is not only the teaching of the necessary knowledge, but also gaining the conviction that all natural phenomena in the world surrounding us are of a material nature.

134. VITKOVA, M.: Razvitiena paznavatelnite interesi chrez obucheniyeto po biologiya (The development of cognitive interests in biology instruction)
Biologiya i khimiya, 24, 1981, No. 3, pp. 46-48.

The author describes various forms of work from the point of view of developing pupils' interests in biology. The most important form is an interesting and well taught biology lesson (in the 9th and 10th classes), where especially topics in genetics and breeding are of interest. Experimental classes are given specially designed problem assignments. The outcome is then compared to a control class and conclusions concerning their effectiveness are then made. The author also discusses extra-curricula activities, especially competitions within the framework of Olympiads, the work of biology hobby clubs, excursions and so-called biology evenings, where especially problems of nature conservation are discussed.

135. ZARKOVA, L.M.: Razvitie na tvorcheskoto mislene na uchenitsite chrez poznavatelni zadachi po biologiya v deseti klas (The development of creative thinking by pupils on the basis of problem assignments in biology in the 10th class)
Biologiya i khimiya, 24, 1981, No. 4, pp. 15-18.

The article is based on the hypothesis that the systematic solving of assignments of a problem and research nature in learning new material contributes to improving the quality of new knowledge and also contributes to the development of creative thinking on the part of the pupils. For the purpose of verifying this hypothesis, an experiment was done in two teaching lessons at the K. Popov Mathematical General Education Secondary School in Plovdiv, Bulgaria. The pupils of the 10th class were divided into two groups; one was experimental and the other a control group. In the course of the experiment the pupils wrote three examination papers. 10 topics were chosen from bio-chemistry, genetics and general biology which were methodologically prepared in advance. Also criteria for an analysis of the outcome were prepared in advance, including indicators of productive thinking, its scope and the degree to which it is operable. The findings indicated that the experimental group achieved much better results than the control group.

7.6 Biology curricula and teaching syllabi

136. BURAK, L.: *Jak realizować program biologii z higieną w kl. IV.* (How to use the biology teaching syllabus for teaching hygiene in the 4th class) Biologia w szkole, 34, 1981, No. 2, pp. 98-102. 2 tabs.

The teaching syllabus for the 4th class of general education secondary schools includes three basic topics: the environment, the conservation and creation of the environment and human hygiene and health. The author provides a detailed outline of that section of the topic on the environment which concerns terrestrial life. It includes 14 teaching lessons, which are described in detail: 1) A terrestrial environment and the conditions for life it provides. 2) A description of a terrestrial environment on the basis of the example of a forest (with excursion). 3) How organisms influence the conditions existing in a terrestrial environment. 5) The adaptation of plants to life in a terrestrial environment. 6) The adaptation of animals to a terrestrial environment. 7) Mutual relations between living organisms. 8) What are food chains. 9) Communities of organisms living in various environments. 10) The population of a cultivated field (with excursion). 12) Young and adult organisms in a biocoenosis. 13) A comparison of the conditions for life in a forest, steppe or desert environment. 14) Repetition; how organisms (flora and fauna) adapt to a terrestrial environment.

137. CICHY, D.: Entomologia w nauczaniu biologii
(Entomology in biology instruction)
Biologia w szkole, 34, 1981, No. 3, pp. 152-155. 1 fig.

Entomology is an important section of zoology, especially applied entomology. The author has examined teaching syllabi and textbooks and found that problems connected with entomology appear throughout the syllabi, not only in zoology, but also in human biology, hygiene and in various elective subjects connected with biology and chemistry. Entomology topics can be found in textbooks used in Polish schools already beginning with the 3rd grade of basic school, where children learn about the most important pests of fruit trees and about the domestic fly. In the 4th class the concept of insects is developed, as well as basic morphological terms. In the 5th class the syllabus includes water insects, human parasites, ants and forest pests. In the 6th class entomology is not taught. In the 7th class topics concerning insects in general, butterflies, insects which are useful and those which are pests and insect systematics are taught. In secondary school, entomology is represented in the 9th, 10th and 11th classes, but predominantly in the 10th class. In general education secondary schools elements of entomology are taught in the 2nd, 3rd and 4th classes, but especially in the 3rd class. The basic entomology syllabus in basic school is in the curriculum for the 7th class. The author also describes various laboratory excercises devoted to insects.

138. CICHY, D. - SZYLARSKA, E.: Normy wymagań do programu nauczania w klasie V. (Standards of requirements for the teaching syllabus of the 5th class)
Biologia w szkole, 34, 1981, No. 4, pp. 203-206.

The authors here discuss the standards of requirements for the biology teaching syllabus for the 5th class. These standards concern skills which the pupils should learn during biology instruction in the 5th class. A total of 37 items are cited as the required standard.

139. Der neue Saarländische Biologie-Lehrplan für die Hauptschule (The new biology curriculum for basic schools in the Saarland)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 8, pp. 280-283. 2 tabs., survey of curricula and syllabi.

The new biology curriculum for basic schools assumes the following number of weekly hours of biology instruction: 2 in the 5th class, 2 in the 6th class, 1 in the 7th class, 2 in the 8th class, 1 in the 9th class. This equals 60 hours in the 5th, 6th and 8th classes and 30 hours in the 7th and 9th classes during the school year. The objective of biology instruction is to provide knowledge for dealing with life situations, to acquire information important in life for the mental development of young people, to be able to function adequately both intellectually and manually and to fulfil educational aims from three different point of view: of science, the pupil's and that of society. The draft of the new syllabi and curriculum has 5 specific objectives: the pupil should be able to identify representatives of domestic flora and fauna, become acquainted with the general principles and laws of development of living organisms, understand the relationship between man and the environment and understand the importance of the conservation of the environment and nature; he should also gain sufficient knowledge concerning the human body to maintain health and awareness of the consequences of sexual behaviour; the pupil should learn to control and use basic types of mental processes and basic methods of scientific work in biology. The article also contains a survey of the curriculum and teaching syllabi concerning individual topics.

140. HISPAŃSKA, B.: Reforma programów nauczanie i podręnczników w wzkołach węgierskich (A reform in the biology curriculum and textbooks used in Hungarian schools)
Biologia w szkole, 34, No. 2, pp. 121-123.

Preparations for reforming the biology curriculum in Hungarian schools began already in 1960. The new curriculum, teaching syllabi and textbooks were completed in the school year 1978/79 and also began to be used in all first classes. In the following year they were introduced into the 2nd classes and by 1 [illegible] 1980 into the 3rd classes. By 1985/86 the change will be completed in the whole of basic school. All materials, curricula, teaching syllabi and textbooks were verified for three years in 30 schools by experts from research institutes and by teachers. The verification process also included tests of knowledge and skills. The Regional Pedagogical Institute in Budapest assessed the work of the experimental schools from throughout the country. On the basis of this verification, various changes were carried out in the teaching syllabi and in the experimental textbooks. The main content of the new teaching syllabi places stress on education towards environmental and nature conservation, an understanding of the mutual relation between plants, animals and man and the relation of all three to non-living nature, as well as the laws of evolution, the structure and function of organisms, a systematic survey of organisms and general laws of biology. Among the new items is a nature studies course (2 hours per week in the 1st to 3rd classes and in the 4th to 5th classes). In the 6th class there is an analysis of the bio-coenoses found in Hungary (a synthesis of morphology and anatomy), in the 7th class the organization of the living world (unicellular and multicellular organisms, plants, animals, man), the structure and function of a plant and animal cell (viruses and bacteria) and physiology. In the 8th class new items include the hormonal and neural regulation of living organisms, genetics, evolution theory and the relation between man and the environment. Handbooks for teachers have been published to accompany all the new textbooks. Also a didactical journal for teachers has been publishing various material on the change and several books have been published to aid teachers.

141. KARATAYEVA, N.B.: *Nauchniye osnovi gigieni organov dikhaniya* (The scientific foundations of the hygiene of the respiratory system)
Biologiya v shkole, 55, 1981, No. 6, pp. 47-50.

The intake of oxygen occurs in the alveoli (an adult has 700 million of them). In children the weight of the lungs in relation to body weight is from 1 : 43 to 1 : 59. At 14 to 16 years of age the volume of the lungs is twenty times that of the neonate. The article contains other information concerning the structure of the lungs and the course of respiration. Attention is also devoted to problems concerning the stay of people indoors, the damage done to the organism by tobacco smoke, especially to a developing organism.

142. Ministerstwo oświaty i wychovania, Instytut programów szkolnych: *Instrukcja programowa dla lyceum ogólnokształcącego. Realizacja programowa dla lyceum ogólnokształcącego. Realizacja materiału nauczania z biologii i higieny w roku szkolnym 1981/82.* (Instructions concerning the curriculum for general education secondary schoools: Implementing the curriculum for general education secondary schools. Implementing teaching syllabi for biology and hygiene in the school year 1981-82).
Biologia w szkole, 34, 1981, No. 4, pp. 237-240.

In view of the transition to a five-day week, the Ministry of Education has changed the curriculum and teaching syllabi for the school year 1981/82. New general education secondary schools (lyceums) will have the following biology and hygiene curriculum:

specialization	1st year	2nd year	3rd year	4th year	total
basic	-	2	2	2	6
humanities	-	2	2	2	6
math.-physics	-	2	1	2	5
biology-chem.	3	3	4	4	14
classics	-	1	2	2	5

The school year begins on September 1st and ends on June 30th. 2 hours a week thus represent 80 lesson per school year; in comparison to the 74 taught previously this is an increase. Changes concerning the teaching syllabi and the time devoted to various topics are also described.

143. Ministrestwo oświaty i wychowania, Instytut programów szkolnych: Instrukcja programowa dla ośmioletnij szkoly podstawowej-biologia z higiena. Realizacja programu nauczania biologii w roku szkolnym 1981/1982 (Instructions concerning the biology and hygiene curriculum for eight-year basic schools. The implementation of the biology curriculum in 1981-82)
Biologia w szkole, 34, 1981, No. 4, pp. 235-236.

The Ministry of Education, together with the Institute for School Curricula, has announced changes in the biology curriculum for the school year 1981/82. In basic schools, biology will be taught in the 4th to 7th class for 2 hours weekly and in the 8th class for one hour weekly. With 2 hours weekly, biology will be taught 80 hours per school year, with 1 hour weekly for 40 hours. The information also includes new allocations of time for various topics as specified by the teaching syllabus.

144. *Program biologii z higiena, dla klasy V.* (The biology and hygiene curriculum for the 5th class)
Biologia w szkole, 34, 1981, No. 4, pp. 195-199.

A group of authors, including experts in biology, in the didactics of biology and practical teachers, as well as those who teach at institutions of higher learning, have prepared a definite version of textbooks after their experimental version had been in use in experimental teaching. This newest version has now been submitted to the Ministry of Education for approval. The definite version of the new curriculum and changes in the teaching syllabi will be introduced in the school year 1982/83. In the 5th class biology is taught for 2 hours weekly. The main topics of the teaching syllabus in this class are the following: methods and work techniques, the characteristics of a living organism, the variability and unity of unicellular organisms, the variability and unity of algae, the variability of invertebrates, conservation of the environment and manadatory cultivation and breeding skills.

145. *Programma fakultativnogo kursa "Osnovi biogeocenologie"* (The teaching syllabus for the elective course "The foundations of bio-geo-coenology)
Biologiya v shkole, 55, 1981, No. 4, pp. 42-44.

The elective course on bio-geo-coenology is for the 9th class. Its 35 lessons are divided among 8 topics:
- the biosphere (5 lessons)
- the bio-geo-coenoses (5 lessons)
- plants as the creators of organic substances in the bio-geo-coenoses (5 lessons)
- herbivores in the bio-geo-coenoses (3 lessons)
- predators and parasites in the bio-geo-coenoses (3 lessons)

- decomposers in the bio-geo-coenoses (6 lessons)
- the agro-coenoses (6 lessons)
- ecology, evolution and nature conservation (2 lessons).

146. Rekomendatsii po otsenivaniyu znaniy uchashchikhsya (Recommendations for assessing pupils' knowledge)
Biologiya v shkole, 55, 1981, No. 5, pp. 29-30.

The journal here publishes comments concerning the improved version of the teaching syllabus which are divided into three parts:
- the marking of pupils' oral answers,
- marking pupils' practical skills in experiments,
- marking pupils' practical skills in observations.

For each section the author specifies very precisely how knowledge and skills should be assessed by the teacher with marks from 5 to 1.

147. RUMYANTSEVA, M.N.: O dal'neyshem uluchsheniyi prepodavaniya biologii v svyazi s vvedeniem usovershenctvovannoy programmi (On the further improvement of biology instruction in connection with the introduction of improved teaching syllabi)
Biologiya v shkole, 55, 1981, No. 4, pp. 25-28.

The author here reports on a seminar of the same name, which was held on May 4th do 8th 1981 in Tallin in Soviet Estonia. The problems discussed can be divided into several groups:
- the further improvement of the educational and teaching process in biology;
- the content and structure of teaching syllabi and their new sections (requirements of knowledge, marking, interdisciplinary relations);
- organizing work and instruction according to the improved syllabi;

- utilizing the experience of teachers with the improved syllabi;
- the teaching and education of ecology.

148. SURAVEGINA, I.T.: *Soderzhaniye ekologicheskogo obrazovaniya v usovershenstvovannikh programmakh po biologii* (The content of ecological education in the improved biology teaching syllabi)
Biologiya v shkole, 55, 1981, No. 6, pp. 16-22.

Ecological education is one of the aspects of the communist education of pupils which has the objective of forming their relation to the environment. It can be divided into four groups or components:

1. A system of knowledge concerning mutual relations between society and nature (ecological knowledge).
2. Acquiring an ecological orientation towards nature as a whole (at present this orientation also has a strong economic component - in relation to natural resources).
3. A system of standards and rules of behaviour in relation to nature (ecological ethics as its most important component).
4. Skills and habits needed to study nature and advance its conservation.

Every topic in the teaching syllabus has its own specific importance for ecological education. Biology is thus one of those teaching subjects which has the breadest impact (beginning with its classical subject-matter, up to the aspect of the biocoenoses). Specific opportunities provided by the biology syllabus for improving ecological education are cited in detail.

7.9 Endeavours for modernization in biology instruction

149. GENZ, A. - BERGER, D.: Zum aktuellen Thema
(Concerning a timely topic)
Biologie in der Schule, 30, 1980, No. 1, pp. 29-31.

The authors positively assess the general concept of modernized biology teaching in the 8th class, as well as the approach used by the textbook and methodological handbook for teachers; on the basis of their own experience they express critical comments concerning the topics "humans" and "respiration".

150. LIŠKOVÁ, E.: K modernizaci obsahu výuky zoologie v 6. ročníku základní školy (On the modernization of the zoology teaching syllabus in the 6th class of basic school)
Přírodní vědy ve škole, 32, 1980/1981, No. 1, pp. 6-8.

The author discusses specific problems of zoology teaching in the 6th class. In the new concept of zoology teaching certain very positive changes have been introduced. The zoological system is approached from a developmental point of view. The subject-matter taught includes only selected didactical types which are mostly demonstrations; the material needed for them can be easily obtained. The textbook stresses the practical importance of zoology, since the application of its findings both in human and veterinary medicine are very important. The ecological point of view is stressed throughout the zoology course and various aspects of ethology have been included. The laboratory work essentially does not differ from the modern concept of zoology (stress on the observation of objects and the use of a microscope).

151. TOPF, H.: Zum aktuellen Thema (Concerning a timely topic)
Biologie in der Schule, 30, 1980, No. 1, p. 29.

In a discussion concerning the modernization of the biology teaching syllabus for the 8th class the author concentrates on the topic of respiration. He agrees with the general concept, but has some negative comments on partial aspects (for instance the differentiation between internal and external respiration), and suggests a different structuralization of the subject-matter.

152. WÓCIK, Z.: Koncepcja wiełostronnego nauczania - uczenia sie i jej stosowanie na lekcjach botaniki w klasie VI. (The concept of comprehensive teaching and learning and their use in botany lessons in the 6th class)
Biologia w szkole, 34, 1981, No. 11, pp. 42-47. 3 tabs.

The author here discusses problems connected with the so-called strategy of instruction (teaching and learning) in botany lessons in the 6th class of basic school. Teaching-learning strategy is based on the teaching and educational objectives of the course, the methodology used and the media and organizational forms of teaching used. The author distinguishes an A-strategy which forms the foundations of the science in question and is based on associative psychology, while P strategy is used in introductions to new sectors of science on the basis of solving problems (of an either practical or theoretical nature). An O strategy is based on practical learning and becoming acquainted with reality. E strategy concentrates on the development of emotional processes (and is used predominantly in other teaching subjects than biology). In some teaching lesson a teacher will use only a single type of strategy while in others, two or three strategies. The strategy used greatly influences the nature of the whole teaching lesson. The author submits various possibilities for the utilization of strategies in botany teaching in the 6th class of basic school in the following topics: infectious bacteria and protective inoculation, the structure and life cycle of algae, the planting of kidney beans into various depths of soil, the structure and life conditions of the Albugo candida mold, the structure and life of the shield fern, the structure and life of the Horsetail and club moss, the proliferation of coniferous trees in nature and their significance for the national economy. These topics are outlined so as to clearly show the use of different strategies on the basis of specific examples.

8.2 The didactical principle of combining school work with every-day life. The regional and current aspect.

153. HORN, F.: Lebens- und praxisbezogenes Lernen durch enge Verbindung von Schule und Betrieb (Close affinity between theory and practice help learning)
Biologie in der Schule, 30, 1981, No. 9, pp. 353-362.

The use of biological knowledge in practical life helps in the satisfaction of people's primary needs, such as nutrition, protection against disease and the conservation and utilization of natural resources. When pupils do practical work in agriculture they are able to learn at first hand about the importance of agriculture. The close links between school and enterprise are an expression of the polytechnical nature of education. The author discusses the utilization of various experiences gained by pupils in work activities and cites various published work on this subject. Specifically, the work of pupils on a dairy farm and a poultry farm are described. In the final part of the article he cites several conclusion which should be drawn from this experience, such as the need to integrate various knowledge taught to pupils and to systemize and apply this knowledge.

154. KINTZEL, W.: Lebensnah unterrichten - Forderung des Tages (Instruction connected with life - the challange of the day)
Biologie in der Schule, 30, 1981, No. 9, pp. 363-364.

On the basis of three examples the author demonstrates how teachers in the district of Lübz have quickly reacted to the resolution of the Xth Congress of the Socialist Unity Party. The first example is related to the topic "A biotic and abiotic environment", taught in the 9th class, the second to the topic "Excitation - a basic characteristic of living organisms", taught in the 8th class and the third is connected with the topic "Energy flows in the eco-system", taught in the 11th class.

8.5 The didactical principle of ostensiveness or the unity of the specific and the abstract

155. NOWAK, K.: Jak wykorzystuję najbliższe otoczenie szkoły w nauczaniu biologii z higieną w klasie IV.
(How to make use of the close vicinity of the school in biology and hygiene teaching in the 4th class)
Biologia w szkole, 34, 1981, No. 2, pp. 94-97.

In biology instruction, especially in the lower classes, it is very important that pupils come into direct contact with nature. Essentially this is an acknowledgement of the psychological principle according to which all cognitive processes in children have a specific, image-like nature. Thus endeavours to try to get pupils outdoors as much as possible are quite correct. The immediate vicinity of the school can be used for this purpose, as well as the school experimental plot of land, flower beds or alpine gardens found in the school garden, vegetable beds, a fishpond or river(in this case the river Rokity), beds where various medicinal and other herbs are cultivated, natural reservations in the vicinity of the school, some industrial enterprises (such as dairies or bakeries and health care facilities). All these places can serve as the point of departure for a number of topics. Outdoors, pupils can collect samples, observe, make calculations, systematize what they learn, etc. All the activities described by the author were carried out in 5 groups, which worked together throughout the school year. The findings from the experiments and observations should be written into special notebooks. Before beginning field work, the teacher should in-form his pupils about the planned project in class and if required, again outdoors. The author's groups of pupils received the following assignments: 1) Define terrestrial living conditions and the term population. What is the influence of terrestrial conditions upon the life of flora and fauna ? The biocoenoses of the forest and of the field. 2) An aquatic environment and the conditions of life in water. 3) Contagious disease and how to avoid them. 4) The organization of work and recreation.

8.6 The didactical principle of combining theory and practice

156. YEGOROVA, T.G.: *Vospitaniye u uchashchikhsya aktivnoy zhiznennoy positsiyi v processe opitnicheskoy raboti* (Educating in pupils an active attitude towards life in the course of experimental work) Biologiya v shkole, 55, 1981, No. 1, pp. 57-59.

Agricultural experiments have an important role to play in developing the skills of pupils for their later use in practical agriculture. The pupils should become aware of the economic importance of progressive methods especially during encounters with foremost specialists in agricultural research, such as the staff of the department of agricultural chemistry, as well as chief agronomists, zoo-technicians, veterinary surgeons, etc. Schools can also organize production teams which contribute to solving selected practical problems. The author describes experimental projects on the use of complex mineral fertilizers on the basis of compost and peat, manure and lime, used for potato cultivation and shows how pupils in these experiments must use not only the knowledge gained in biology, but also in chemistry, physics and mathematics. Such a complex approach not only educates pupils towards an understanding of the complex nature of modern agriculture, but also influences them in the making of a vocational choice. It especially helps them to understand that the correct combination of individual work and the work of the team provides broad opportunities for the implementation of the creative abilities of the individual.

8.8 The didactical principle of taking into account interdisciplinary relations

157. BAER, H. - W. - BARTELS, A.: Grundlegendes Wissen und Fachkoordination im Biologieunterricht. Bericht über die XVII. Schulbiologentage 1980 im Rostock
(The teaching syllabus and interdisciplinary relations in biology instruction. Report on the XVIIth School Biology Congress in 1980 in Rostock)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 103-107.

The authors describe the papers presented to meetings of Congress sections. The first section dealt with interdisciplinary relations in the lower and medium classes of basic school, the second with interdisciplinary relations in teaching in the 8th to 10th classes of general education secondary school. Each paper is briefly described.

158. FEDOROVA, V.N.: K probleme mezhpredmetnikh svyazey v processe obucheniya biologii (Concerning the problem of interdisciplinary relations in biology teaching) Biologiya v shkole, 55, 1981, No. 3, pp. 23-26.

The improved new teaching syllabus includes recommendations for including "interdisciplinary relations" every after topic; the problem now is to really implement these recommendations in instruction. Explaining interdisciplinary relations has three mutually interconnected functions: the educational, developmental and the teaching. In this way the basic elements of the teaching syllabi for various subjects are coordinated and lead to the gradual discovery of the essence of biological knowledge; there is also a positive influence upon the forming of pupil's worldviews. For the pupils of the 7th and 8th or 9th and 10th classes seminars can be planned concerning interdisciplinary aspects of what they are studying. The author has already published similar recommendations previously (cf. Biologiya v shkole, 1975, No. 6).

159. HERZ, W.: Einige Bemerkungen zum Beitrag "Zur Nutzung der Beziehungen zwischen dem Biologieunterricht und dem Chemieunterricht" (Some comments on the paper "On the Utilization of the Relation Between Biology and Chemistry Instruction")
Biologie in der Schule, 30, 1981, No. 4, pp. 165-168. 2 figs.

The author discusses a paper published in issue No. 10, 1980 of the journal Biologie in der Schule, written by W. Sehmram. He points out that chemical knowledge can be made use of to achieve a better unterstanding of physiological processes and for the development of specific activities, such as observations and experiments, as well as for the utilization of problem teaching methods and the forming of a materialistic worldview. He also argues against the opinions expressed in the above cited article. For instance the terms "energetically rich" and "energetically poor" substances can be used, as well as the dissociation of water during photosynthesis, oxidation and reduction.

160. HESSE, M.: Wird in der Photosynthese reduziert oder oxidiert ? Ein Beitrag zur Stellung der Chemie in Biologieverständnis von Studienanfängern (Is carbon dioxide reduced or oxidized during photosynthesis ? A contribution to the status of chemistry in the biological understanding of beginner students)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 9, pp. 268-276. 9 tabs.

On the basis of a study of students at institutions of higher learning in the first semesters of their biology specialization course, serious gap were found to exist in the basic understanding of chemical processes. At present biology and chemistry are very closely interlinked and the borderline specialization of bio-chemistry has developed, while molecular chemistry and physiology also cannot do without the extensive use of chemistry. Students should undergo a repetition of basic chemistry and sit for an examination before taking the biology course at an institution of higher learning. Some biological knowledge cannot be understood at all without chemistry, for instance photosynthesis. The main cause of the existing situation is that in the upper classes of secondary school, pupils have the possibility of taking only biology, without chemistry; the teaching syllabus for this course only recommends the inclusion of several chapters concerning chemistry. This situation should be changed and chemistry should become manadatory. Too early specialization in biology should be done away with and replaced by a more extensive and better quality general science course. Also in the upper grades of basic school chemistry teaching should be improved. If this is not done, biology will be considered an escape subject which does not require such a rigorous mind. By having elective subjects in secondary school the shortage of chemistry and physics teachers is only being prolonged.

161. KOMISSAROV, B.D. - KALINOVA, G.S.: Meshpredmetniye svyazi kursa botaniki 5 klassa (Interdisciplinary relations in the botany course in the 5th class) Biologiya v shkole, 55, 1981, No. 3, pp. 26-31.

Botany in the 5th class allows the teacher to make use of interdisciplinary relations from preceding classes (for instance nature studies and work education), as well as those taught in the 5th class (work education and geography). Experiences from a number of schools are described, where these inter-disciplinary relations have been suitably included into class work. The author cites a number of examples from the botany syllabus used in the 5th class and stresses how to prevent the fragmentation of biological science and at the same time how to implement the recommendations cited in the improved version of the teaching syllabus.

162. KÖPPL, R.: Diferenzialrechnung in der Ökologie und Populationbiologie (Calculus in ecology and population biology)
Der Biologieunterricht, 17, 1981, No. 4, pp. 95-108, 5 figs.

Biological disciplines which deal with predominantly quantitative phenomena require the use of mathematics if they are to be dealt with successfully. One such field is ecology and especially the ecology of populations. The author describes the theoretical and practical utilization of calculus in the calculation of the growth of a bacteria population. He distinguishes, on the basis of the initial number of individuals, discontinuous growth (where the initial number = 1) and continuous growth (with the initial number of individual = 1 million). On the basis of calculus it is possible to arrive at basic differential equations; on the basis of examples, the author demonstrates also other uses for calculus, such as calculating the growth of timber in a forest during a specific duration of time, predictions of population growth when annual increments are known, etc. The outcome of the differential equations cited are also showen as graphical representations.

163. NIKISHOV, A.I.: Nekotoriye vozmozhnosti realizatsiyi mezhpredmetnikh svyazey kursa zoologii (Some opportunities for implementing interdisciplinary relations in zoology)
Biologiya v shkole, 55, 1981, No. 6, pp. 25-30.

For all practical purposes every topic can be used to develop interdisciplinary relations, as the improved teaching syllabus recommends. But zoology is especially suitable for this purpose. For instance close links exist between zoology and mathematics (in the 5th class), zoology and physics and zoology and chemistry in the 6th class. The closest links exist between zoology and the subject natural science taught in the 4th class and zoology and geography, taught in the 6th class. However, zoology lessons should not become a repetition of the above mentioned subjects. Only such knowledge which is directly linked to the forming of biological notions should be revived. Such opportunities are developed in the article in some detail.

164. POPOV, K. - UGRINOVA, K. - SPASOV, A.: Ratsionalizirane na uchebno-vzpitatelniya proces v prakticheskata deynost pri obucheniyeto po biologia (The rationalization of the teaching and educational process during practical activities in biology instruction). Biologiya i khimiya, 24, 1981, No. 3, pp. 49-51.

An experiment was carried out in two Bulgarian schools where interdisciplinary relations between practical excercises in biology in the 5th class and cultivation work done in the 7th class were utilized. During the biology excercises pupils learnt how to graft fruit trees and grape vines. It was found that even young pupils are capable of learning to use a grafting knife under the supervision of teachers, if the lesson and the needed material are properly prepared. The pupils from the 7th class contributed to this preparation.

165. STRICK, H.K.: Der Chiquadrat-Anpassungstest im Mathematik- und Biologieunterricht der Sekundarstufe II. (A X^2 adaptation test in mathematics instruction and in biology classes in the upper classes of secondary school)
Der Mathematische und naturwissenschaftliche Unterricht, 33, 1981, No. 3, pp. 139-147. 6 figs., 5 tabs., 11. lit.

The X^2 test is a statistical method which is often used in scientific biology. Also a number of textbooks used in the upper classes of secondary school use this mathematical method of assessing data, for instance in genetics. By the use of the test, biological findings become more precise. The theoretical basis for this test cannot be adequately explained in the mathematics course and the relevant biology textbooks thus merely describe the use of the test without thoroughly explaining it, because this part of the biology course runs ahead of the mathematics course. The article describes the specific use of the test in genetics (the cross-fertilisation of plants). The author describes a binominal test, a X^2 - adaptation test, critical values for X^2, and the use of the X^2 adaptation test in biology.

8.9 The didactical principle of hygienic and safe biology instruction

166. RICE-STROPE-BROWN: Test your Legal Liability I.Q.
The Science Teacher, 48, 1981, No. 5, pp. 42-45.

A teacher has legal liability for the pupils in his classroom. The authors enumerate ten various situations when school experiments done in the presence of a teacher have led to accidents leading to damaged health. The reader is asked to determine the extent of the teacher's legal liability in each case and the responsibility of the teacher and the pupil. These examples have all actually occured and the authors cite the outcome of litigation which they provide with comments. The article is very interesting because such situations can occur in any school.

9. Methods of biology instruction

167. BARMAN, C.R.: Personalized Instruction in an Introductory Biology Course
The American Biology Teacher, 43, 1981, No. 4, pp.184-188, 195, 4 figs., 3 tab.

The author discusses personalized instruction, which in the sixties became a method widely used in colleges and universities. In this method the subject-matter is divided into small sections, which each student must learn before the whole class can continue with the next section. The article demonstrates the use of the method on the basis of a description of a biology course which uses audio-visual aids to support study. The students can also cooperate mutually and this has proven to be very positive for learning the more difficult sections of the syllabus. The method is assessed on the basis of data arranged in tables, which clearly show the success achieved by this method.

168. DOWNIE, R. - MADEN, R.: Teaching Methods in Biology - How Can We Get Information to Flow ?
Journal of Biological Information, 15, 1981, No. 1, pp. 47-50.

Not only students, but also scientists agree that the methods of teaching biology should be improved. One of the main problems, besides others, is the smooth flow of information which is not on par with needs in the whole educational system. The authors administered 2 questionnairs and summed up their findings into four specific items which they submit for discussion: 1) new information should be assessed, but not processed, 2) study should not be made too facile, the student must exert his own endeavours, 3) traditional instruction carried out with enthusiasm is more important than the early introduction of new methods, 4) teachers and lecturers do not sufficiently study new books and journals, so as to be able to include new knowledge into their course.

169. KOPPE, U.: Über einen interessanten, durch unsere Fachzeitschrift angeregten Erfahrungsaustausch
(Concerning an interesting exchange of experiences, based on the iniciative of our journal)
Biologie in der Schule, 30, 1981, No. 4, pp. 169-170.

A teaching subject committee in the school where the author teaches organized in October 1980 a panel discussion on the subject of systematic repetition. On the basis of materials published in this journal (1979, No. 12), Dr. Schubert was invited to speak. The discussion led to the following conclusions: 1. All opportunities for repetition of the subject-matter taught should be made use of; 2. Repetition should be carried out on a systematic basis; 3. Only essential subject-matter should be repeated and strengthened.

170. KOSTOVA, Z.: Metoda badawcza w nauczaniu biologii (Research methods used in biology instruction) Biologia w szkole, 34, 1981, No. 1, pp. 48-51. 2 tabs.

Chemistry, physics and biology as natural sciences each has its own research method, which are widely used in practice. Biology teaching in basic and secondary general education shools should use these methods in instruction. The author theoretically clarifies the essence of these scientific research methods and shows opportunities for their use in biology instruction. The author also discusses biology teaching methods in general and distinguishes clarification and communicative methods and research methods. The first and second of these is less effective in instruction, the teacher is a source of information and the pupil recieves ready information in the form of an exposition. The role of the pupil is limited to merely committing to memory knowledge or learning the subject-matter in question. In the third type of method - based on research - the role of the teacher is limited to organizing work and formulating the research objective or task and supervising the cognitive activities of pupils is discovering new knowledge and methods of work. This method enriches the pupil not only in the sense of providing him with new knowledge, but also with new methods of intellect and practical activity. The research method greatly increases the interest of pupils in the given teaching subject, they become acquainted with the development of science and scientific knowledge, the pupil himself acquires new knowledge on the basis of his own activities. This also leads to greater self-confidence. The basic elements of the research method in biology instruction include the formulation of the problem, the formulation of a hypothesis, carrying out observations and experiments, formulating the outcome of the work. The author provides an example of how to utilize the research method in a topic taught in the course The Foundations of Ecology in the 9th class, where the problem of biological equilibrium is discussed and then in the topic Biological Macromolecules, which deals with nucleic acids.

171. NEBEL, U.: Selbständige Wiederholung in Klasse 10.
(Individual repetition in the 10th class)
Biologie in der Schule, 30, 1981, No. 1, pp. 24-25.

The author has been attempting for a period of three years to develop the abilities of her pupils by independent repetitions; this is documented on the basis of the example of the teaching unit The Plant Cell. The author provides instructions on how to carry out repetitions and how to prepare for examinations. These instructions are given to pupils at the beginning of the 10th class, together with the book "Biologie in Übersichten". Three weeks before written examinations take place the teacher has consultations with her pupils.

9.5 terview method

172. BOGOYAVLENSKAYA, A.Y.: Ispolzovaniye metoda besedy dlya razvitiya samostoyatelnosti uchashchikhsya na urokakh botaniki v V. klasse (Using a discussion method for developing the independence of pupils in botany lessons in the 5th class)
Biologiya v shkole, 55, 1981, No. 6, pp. 30-32.

The success of the discussion method depends on how correctly the teacher determines the place and purpose of this method in the course of instruction, how well he develops the objective of the discussion and the formulation of questions, how he determines in advance the degree of independence the pupils should have in preparing answers and also how well he plans the activities of individual pupils in the course of the lesson. The discussion can be based on the inductive or deductive method. If the discussion is to be successful, specific prerequisites must be fulfilled:

- the precise supervision of the discussion towards the objective of the lesson;
- making use of interesting facts, the outcome of experiments, and the demonstration of natural objects, etc.;
- the gradual introduction of more complicated problems, which are orientated to an increasing extent towards the independent work of the pupil based on knowledge (the pupils learn to analyse phenomena, to make comparisons, to seek out the essence of a phenomenon, etc.). In conclusion the author describes various situations which may develop in the discussion.

173. KADURINA, E. - GEORGIYEVA, P. - LYUBOMIROVA, K.: Rozvivane poznavatelnata samostoyatelnost na uchenitsite chrez samonablyudeniye v kursa po biologiya v osmi klas (Developing pupils' independent cognition through self-observation in the biology course in the 8th class)

Biologiya i khimiya, 24, 1981, No. 3, pp. 19-27.

The author defines independent cognition in the following manner:

1) the ability to independently obtain new knowledge,
2) the ability to use knowledge thus gained for further selfeducation,
3) the ability to use this knowledge for practical activities in the course of solving every-day problems.

In the 8th class human anatomy and physiology are taught; in order to utilize the above cited abilities of pupils the author teaches 3 methodological units:

1) the work of the heart - a laboratory excercise
2) blood and lymphatic circulation - basic type lesson
3) hygiene of the vessel system - basic type lesson.

For these teaching units pupils can undertake independent practical excercises which are finished by tests with various questions, which are assessed by a scale provided by the author. It has been found that self-observation and experiments really develop the cognitive independence of pupils.

174. WEST, R.W.: Praxis and Possibilities in School Science Education
Journal of Biological Education, 15, 1981, No. 1, pp. 42-46.

This paper is a discussion with prof. D.H. Jennings concerning the content of school science education. In Jenning's opinion, children in school should learn an integrated block of knowledge concerning the physical and living worlds, with special stress on facts and with the use of questions and answers. In Jenning's opinion young people have nothing to gain from learning what is usually called "scientific method". The author of the present article is from the University of Sussex.

9.6 Methods of work with literature (textbook, syllabus, workbook, worksheet, atlas, key for determining flora and fauna

175. AFERINA, L.V.: Iz opita obucheniya uchashchikhsya rabote s uchebnikom (Experiences with pupils learning to work with a textbook)
Biologiya v shkole, 55, 1981, No. 6, pp. 33-35.

To teach pupils to work with a textbook is a task facing every teacher, beginning with the 5th class. The demands made upon pupils in work with textbooks should gradually become more complicated:

1) reading the text in the textbook with the aim of strengthening knowledge (following an exposition);
2) reading the text of a textbook in place of a teacher's exposition;
3) drawing up an outline (table) on the basis of a text in a textbook;

4) drawing an outline with a description;
5) independent filling in of a table on the basis of information from the textbook and on the basis of studying a picture in the textbook;
6) the independent solution of an assignment on the basis of a text in the textbook;
7) the study of a picture in the textbook combined with a discussion concerning its content;
8) the textbook as a source of knowledge for laboratory excercises;
9) writing excerpts and making notes from a textbook;
10) preparing a paper to present to the class on the basis of the textbook and other sources.

176. HAACK, G.: Gestaltung von Bestimmungsübungen - der Einsatz geeigneter Unterrichtsmittel zum Bestimmen von Nadelbäumen in Klasse 6 (A concept for excercises to determine species - making use of suitable aids for determining various coniferous trees in the 6th class) Biologie in der Schule, 30, 1981, No. 9, pp. 377-380. 6 figs.

The teaching syllabus for biology instruction assumes already in the 6th class excercises during which various species are determined with the aid of various tables. However, when pupils use various sources they are usually very unsure of themselves, especially when they use dichotomically determined keys to flora. For this reason other determining aids have been developed and tested practically. The author describes their concept in detail. It is first necessary to repeat what has already been learnt in plant morphology, with the aid of transparencies and the dialogue method of instruction and only then begin to determine species. Besides the determination of specific species the pupils also gradually learn the dichotomic system of determination as a suitable model for further activities of this type.

9.7 Method of observation

177. AKHMADEYEVA, A.K.: V pomoshch krushku yunikh agrokhimikov (Helping a hobby club of young agro-chemists)
Biologiya a vhkole, 55, 1981, No. 4, pp. 47-52. 7 tabs.

On the basis of the present trend towards the intensification and chemization of agriculture, the author recommends studying together with pupils in hobby clubs the history of the use of chemicals on specific fields in the vicinity of the school. The pupils thus learn about the use of chemicals in agriculture and are able to study the changes in crops which occur. Attention can specifically be concentrated on the acid content of the soil, and the amount of movable phosporous and potassium.

178. BECKER, H.: Elektische Phänomene in der Biologie (Electrical phenomena in biology)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 3, pp. 78-83. 15 figs.

The article describes electrical phenomena in nerve cells and the significance, structure and function of electrical bodies in some fish. The topic is suitable for the upper classes of secondary school. Electrical phenomena in nerve cells and their rest and action potential can be studies during observations of the Edible frog (Rana esculenta), on its nervus ischiaticus. The author explains how rest potential is disturbed by some substances, such as acetylcholine, noradrenaline and thianine, which change the permeability of the nerve cell wall and thus cause the development of action potential. Electrical fish (such as Electrophorus electricus, Torpedo marmorata, Malopterurus electricus and Gymnarchus niloticus) are described, especially from the point of view of the structure and function of their electrical apparatus. Its main purpose is defensive and for attacking, as well as for orientation, especially in turbid water. The author also provides instructions for observations and experiments with electrical fish and how to make an electroactinogram with the help of a special apparatus.

179. BENTLEY, I.: Spore Dispersal in Fungi
Natural Science in Schools, 19, 1981, No. 3, pp. 71-75.
8 figs.

The loosening and dispersal of spores in fungi is a very interesting phenomenon, whose study provides opportunities for developing observation abilities without the use of a microscope or other costly instruments. The loosening of the spore can take place passively by an external factor (insects, rainfall, the wind), or actively, when the fungi itself disperses the spores on the basis of its own internal energy. The author explains both methods on the basis of examples of the puffballs Scleroderma citrinum, Lycoperdon Perlatum and Langermannia gigantea as far as the active loosening of spores is concerned, and the stinkhorn (Phallus impudicus) and the Pilobolus as far as the passive loosening of spores is concerned. He also describes in detail the effect of the wind, rainfall and insects in the dispersal of spores as the main factors for the reproduction of these and other fungi.

180. BERGSTEDT, C. - GÖTZE, G. - GRÖNKE, O.: Zur Gestaltung des Beobachtens und Experimentieres der Schüler sowie von Demonstrationsexperimenten in Klasse 12 (Towards a concept of observations and experiments, as well as demonstration experiments in the 12th class) Biologie in der Schule, 30, 1981, No. 7/8, pp. 282-300. 11 figs., 14 tabs.

In instruction in the 11th and 12th classes the independent activities of pupils predominate, especially observations and experiments which are approached in a problem context. The teacher should be aware of the fact that various subject-matter requires specific forms of learning, if the stated objective is to be achieved. The stages of learning include an understanding of the objective of learning, the formulation of a hypothesis, planning the solution of the problem, carrying out the plan and an assessment of the outcome. Group instruction provides a suitable organizational form of instruction for this purpose. The author then surveys experiments which are suitable for the 12th class: Proof of cellulose in cottonwool and in lignin, in newsprint and in wood; The influence of juice pressed from potatoes on hydrogen peroxide and blocking the effects of enzymes with the use of poisons ($CuSO_4$ and $AgNO_3$) and/or surpressing their effect by increased temperature; The experimental proof of the presence of CO_2 in photosynthesis; Proof of glucose in leaves; Proof of strach in leaves; The influence of CO_2 in photosynthesis; Proof of the enzymatic effects of ptyaline on starch; A study of the enzymatic effects of pepsine and HCl on proteins; The enzymatic effect of pancreatic secretin on lactic fats; Measuring oxygen consumption in the respiration of animals; Following the link between respiration and temperature; Proof of the dependency of alcoholic fermentation on temperature; Proof of a threshold in taste sensation with a NaCl solution. For all these experiments the author cites the objective, plan of work, instructions for carrying out and recording findings and assessments. Most of the experiments are cited in two alternative versions.

181. BROWN, C.R.: Some uses in school biology for the prawn Palaemonetes varians LEACH
The School Science Review, 62, 1981, No. 221, pp. 704--708. 4 figs., lit. 6.

The prawn cited in the title represents suitable material for school observations and experiments. It can easily be collected and bred in the laboratory. It measures under 5 cm and is almost transparent. It can be observed in glass vessels 10 x 4,5 x 2 cm with a stereomicroscope (or a stereoscopic lens). It is possible to observe its feeding, heart activity, effect of changes in temperature, osmotic effect upon heart stress, osmoregulational secretion and ventilation of the gills with the use of a carmine solution.

182. BUKATSCH, F.: Eine alltägliche Beobachtung - biochemisch gedeutet (Every-day observations explained on the basis of bio-chemistry)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 11, p. 435, 1 fig.

After boiling an egg for a long time a darkly coloured zone appears on the interface between the egg yoke and the egg white. According to the time of boiling this zone will be green to black-green. The egg contains iron as an important substance for the development of the embryo and it is found in the yoke in a chemically bound manner. When cutting a hardboiled egg we can smell a slight odour of hydrogen sulphide, which is caused by the thermal disintegration of protein. The hydrogen sulphide in the egg white develops in thermolysis under temperatures in the vicinity of 100°C. The author recommends doing two simple and interesting experiments, which prove the presence of hydrogen sulphide in heated egg yoke, the presence of iron in the salts found in an egg, iron compounds appearing together with the hydrogen sulphide and the development of dark coloured iron sulphide on the interface between the egg yoke and the egg white.

183. CLARKSON, J.: Conserving Old Grassland
Natural Science in Schools, 19, 1981, No. 2, pp. 58-61.
5 figs.

Old grassland, which has not yet been destroyed by land improvement or by fertilization and the use of herbacides,can be very valuable for learning about flora and fauna which lives in this environment. The author characterises various types of meadows, their development and historical value, as far as archeological findings are concerned. Also various vertebrates, such as rodents, are described, as well as birds, insects and flora specific for this environment. The need for conserving meadows and partureland with the aim of maintaining this kind of bio-type is stressed. In conclusion, the author provides instructions for founding a small meadow for the purpose of observing the life cycle of such a small area.

184. DAVES, J.A.: The Louisiana Red Swamp Crayfish (Procambarus clarkii) - a crustacean suitable for classroom use
Journal of Biological Education, 15, 1981, No. 1, pp.25-30.
6 figs.

The crayfish mentioned in the title is among the best and most suitable living organisms for use as an object of observation. Its life cycle and reproduction can be observed in a school aquarium. The pupils can systematically follow its sexual dimorphism, copulation, need for food, movement over the floor of the aquarium, the development of a social hierarchy and the development of the embryo; they can also learn morphological as well as general biological terms. The author describes in detail how to breed these crayfish and their life cycle on the basis of his own experience with their use.

185. DREISMANN, G.: Über den Einfluss sozialer Isolation auf das aggresive Verhalten eines Fisches (Lepomis gibbosus, Centrarchidae). (Concerning the influence of social isolation on the aggressive behaviour of a fish (Lepomis gibbosus, Centrarchidae)).
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 1, pp. 11-15. 4 tabs., 1 worksheet.

Ethological studies dealing with the Pumkin seed fish from the family Centrarchidae follow the influence of isolation on the behaviour of the fish. In the experiments described, 13 fish of the same sex were used and placed in aquariums size 17 x 36 x 23 cm, socially isolated for periods of 0, 2, 4 and 8 days and observed for 10 minutes after a partition made of foam polystyrene which seperated the fish, was removed. The behaviour of the fish (combat) was observed between 5 and 6 P.M. (combat took place in regular patterns during this time). Between 6 and 8 P.M. the fish were fed with Daphnia, Tubifex and Cyclops. The temperature of the water was between 19 and 20 °C, the experiments were carried out in March and April 1978. During the experiments the following behavioural patterns were observed: lateral threatening, frontal threatening, hitting with the tail, lateral attacks, attacks aimed at eye markings, attack at mouth area and combat with mouth.

Both positive and negative correlations were found to exist between these behavioural patterns.

186. FEEST, J.: Untersuchungen mit Blumenfrischhalten (A study of substances which keep cut flowers fresh) Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 8, pp. 266-270. 1 tab., 1 worksheet.

Cut flowers in a vase wilt very rapidly. This is caused by a blocking of water based on chains which develop made of gas and the water in the vase. When a stem is cut, air usually enters the tissue. This also happens when water in a vase becomes too warm (when temperature increases from 10 to 20 °C, then in 1 litre of water, 3.5 cm^2 of air is freed). Also muscous substances from the flowers may act to block the passage of water through the tissue of the stem and thus form a cultivating medium for bacteria. Also tissue parenchyma blocks the stem tissue, while polyphenols, influenced by growth substances, also cause the blocking of water. The author discusses possibilities of using chemical substances which prevent the wilting of cut flowers. These substances work by two components: one which prevents the growth of bacteria and fungi and the other which is a nutrient for the plant. The former is done by formalin. The most important component of these substances is glucose, which improves the water equilibrium of cut flowers, protects the colloid structure of proteins and binds damaging polyphenols as glycosides and thus rids the water in the vase of poisons. The author recommends observations with the use of substances which prevent the wilting of cut flowers.

187. FELLARS, L.G.: Non-Destructive Animal Study: Ring Doves, a Model Case
The American Biology Teacher, 43, 1981, No. 8, pp. 420--425, 3 figs.

The author describes how to proceed in the systematic observation of birds in general, on the basis of the example of the Ring dove (Streptopelia risoria), which can be kept in a school laboratory. Feeding, drinking and feather cleaning can be observed, but the main stress is on reproductive behaviour, i.e. courting, copulation, building a next, the alternation of the male and female in sitting on the eggs and caring for the young. An interesting chapter concerns the problem of distinguishing the "language" which doves use and the movements which the young gradually learn. Students write their observations into a diary and finally write reports.

188. GILL, J.: A Review of Techniques for the Experimental Study of Mitosis
Journal of Biological Education, 15, 1981, No. 2, pp. 105-106.

A number of preparation techniques have been developed for the study of mitosis which use the staining of chromosomes. However, such methods often require the use of complicated apparatus, are difficult to do and require substantial skills. The author provides a survey of the methods most frequently used, makes suggestions for their simplifications so that less time, fewer skills and less costly apparatus are required. Among these is the deeto-orcein method which is used with garlic (Allium sativum).

189. HUNDT, R.: Untersuchungen zur Wirkung der Konkurrenz auf das ökologische Verhalten der Pflanzen gegenüber abiotischen Umweltfaktoren (A study of the effects of competition on the ecological behaviour of plants towards abiotic factors in the environment)
Biologie in der Schule, 30, 1981, No. 9, pp. 365-374.
3 tabs., 4 figs.

The ecological potential of a species is determined by competing species within a specific bio-coenoses, which the author documents on the basis of various biocoenoses; he uses them to characterize essential aspects of ecological laws connected with physiological and ecological potential. He also discusses the concept of ecology instruction in the 11th class. He cites various examples for illustrating these laws and recommends making these laws more specific by organising observations outdoors. In conclusion he cites suggestions for assignments to give to students, such as a study of the effects of competiton on the ecological potential of mustard and wild radish in relation to soil reactions.

190. YEVTAFIYEV, Y.V.: Marshrutniy uchet ptits (A survey of birds on a specific route)
Biologiya v shkole, 55, 1981, No. 5, pp. 69-73. 2 figs.

The author provides a precise description of how to organize the observation of birds on specific permanent routes taken by pupils (for instance to school, etc.). Such a method contributes to pupils' better understanding of biology and develops in them a positive approach to nature. They also learn to identify birds they had not known previously.

191. PEARSON, F. - WEARY, M.: Classroom Applications Using Limulus polyphemas - The American Horseshoe Crab
The American Biology Teacher, 43, 1981, No. 8, pp. 440--444 and 472. 5 figs.

The American Horseshoe Crab (Limuluy polyphemas, syn. Xiphsura polyphemus) is a member of the Chelicerata phylum, the Merostonata class and the Xiphosura order. Its life cycle is very interesting and for this reasons the authors suggests its use for school experiments and observations. They describe its annual cyclus under conditions of captivity in a classroom and observations (including microscopical ones) which can be carried out, including the observation of its reaction to changes in temperature, light and other influence. In the microscopy part, the pupils become acquainted with the developement of the crab´s embryo and the fertilization of its eggs in vitro.

192. McCULLOCH, J.H.: A Method for the Observation of a Typical Fern Life History
The American Biology Teacher, 43, 1981, No. 3, pp. 124--126. 4 figs.

The life cycle of the fern is an excellent example for observing the alternation of generations: the simple, small haploid gamenotype and the large, more complex diploid sporophyte include two distinct morphological systems during the life of the fern. The author recommends an experiment which provides opportunities for both microscopical and macroscopical observations of structures on the basis of a method tested during several years of botanical experiments, where simple aids have been used.

193. McLURE, J.W.: Observing Nature's Rhythms in the Woodcock
The Science Teacher, 48, 1981, No. 3, pp. 28-29. 2 figs.

The American woodcock (Philohela minor) is an excellent object for observations by students. Its life rhythm is totally adjusted to the biosphere. The author describes its annual cycle, including copulation, building and protecting a nest and the laying of eggs, as well as hatching the eggs and caring for the chicks. Also the bird's protective colouring is described, the warning signals it makes and its general behaviour. The author also provides instructions on how students should observe, what to notice and which questions to answer later on.

194. MERRITT, S.V.: Studies in Human Chronobiology
The American Biology Teacher, 43, 1981, No. 5, pp. 261--266. 5 figs.

The author describes one of many chronobiological procedures which he himself carried out with his students. It concerns the relation between temperature in the mouth and other physiological and psycho-motor rhythms, which still has not been explained in a satisfactory manner. The measurment should be carried out during the day, in hourly intervals by placing a thermometer in a protective covering into the mouth, so that it rests on the right side of the tongue for a period of three minutes. A chronometrical study can concentrate on various symptoms, such as bronchitis, headache, flue, ovulation, etc. Numerical data is plotted on a curve which serves to confirm the relationship between temperature in the mouth and life rhythms existing in various somatic situations.

195. MEYER, A.D.: Effects of a Tobacco Suspension on Euglena

The American Biology Teacher, 43, 1981, No. 8, pp. 454--455. 3 figs.

Smoking has become one of the scourges of mankind and the negative effects of tobacco smoke are being felt even by non-smokers. The author of the article here attempts to show students the negative effects of smoking on the basis of experiments with Euglena viridis. A cigarette is soaked in 50 ml of destilled water overnight. The students first observe healthy strains of Euglena under a microscope, their shape, behaviour and movement. Then drops of the tobacco suspension are added and the effects on the Euglena are observed. Usually chaotic movement occurs, their shape changes from oblong to round and finally movement ceases and they die. Individual stages of this development can be drawn by the students. Afterwards a discussion can be held concerning the effects of nicotine on the living cell.

196. RAEBURN, H.: The use of mouthbrooders in secondary school biology

The School Science Review, 63, 1981, No. 223, pp. 292--294. 1 fig., 4 lit.

A suitable fish for experiments and observations in school aquariums is the mouthbrooder (Melanochromis auratur). After fertilization the female keeps the eggs in her mouth. This fish belongs to the Cichlidae and origimated in Lake Malawi in Africa. Under natural conditions the fish eats only algae, but in an aquarium it will eat any living or dead substance of animal origin. The fish has well developed territorial behaviour, rivality between males and interesting behaviour during mating and care of the young, as well as sexual dimorphism.

The best water for breeding mouthbrooders has a pH factor equal to 7.7 - 8.6 and 25 °C temperature. The water requires frequent or constant filtration so that decaying remnants of food do not contaminate the water. The floor of the aquarium should be covered with limestone gravel (approx. 2 cm. in size) and growing plants. The fishes do not like direct light (hence the plants must be very hardy, for instance Echinodorus), The author describes in detail how to breed this fish and various opportunities for ecological observations.

197. RAEBURN, H.: Using Jewel Cichlids in Secondary School Biology (Hemichromis bimaculatus)
The School Science Review, 63, 1981, No. 221, pp. 699--700. 3 lit.

The Jewel cichlid Memichromis bimaculatus is a very popular aquarium fish, which is easily obtainable, and is easy to keep and breed. For this reason it is very suitable for various experiments and observations done in secondary school biology courses. In ethology teaching, the fish can be observed for its territorial behaviour, courting, mating, care of roe and young. This fish is widely found in Africa, in the Nile, Niger and Congo river basins. It requires a pH factor in the water between 6.0 and 7.5 and temperature; between 24 - 26 °C. The first mating takes place already at the age of 3 - 4 months, when the fish are 4 - 6 cm long. The fish are kept in pairs, in groups or in mixed communities with other cichlids. They require an aquarium at least 60 x 30 x 30 cm, where the roe is placed on the floor, which should for this purpose have various stones on it (slate is best). These fish require proper feeding, live feed of a varied type, inluding various flakes which provide minerals and vitamins. This fish has almost no sexual dimorphism. Sometimes the male is of a lighter colour. During mating the following behavioural patterns can be observed: bilateral spreading of fins, spreading of gill covers, the male beats his tail against the female, the female lays the eggs, the male adds the milt. Care of the young includes the following patterns: the eggs are guarded and fanned by the fins, both parents synchronize this activity, the freshly hatched young are moved into small excavations in the sand on the floor, swimming young are pulled into sand nests, the young are fed with fish meal (made of crustacean larva).

198. RIEDL, A.: Der Waldboden - Experimente und Untersuchungen (Forest soil - experiments and observations) Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 7, pp. 216-223. 9 figs.

The article deals with various problems concerning forest soil and the opportunities it provides for teaching in the upper classes of secondary school. It contains a number of interesting and easily organised observations and experiments concerning the decay of fallen leaves, an analysis of various soil components and humus acid, the permeability of forest soil by water and air, the accumulation of humus-forming substances in the soil, the respiration of forest soil and determining the presence of microorganisms in the soil. Observations and experiments are described in relation to school laboratory excercises. Much attention is devoted to the phenomenon of re-cycling. In conclusion of a laboratory excercise the pupils can make a model of a cross-section of forest soil.

199. MASHOVA, A.T.: O fenologischekoy rabote v skolakh (On phenological work in schools)
Biologiya v shkole, 55, 1981, No. 4, pp. 59-63. 3 figs.

In many schools in the Moscow region pupils have been carrying out phenological observations for more than 10 years. The author cites examples of nature calanders made by pupils for various regions; she recommends cooperation with other schools for this purpose.

200. SCHWARZENBACH, A.M.: Die Fortbewegung des Fisches. Untersuchungen mit Stroboskop und Fischrad (The movement of fishes, observations with a stroboscope and a fish wheel)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 3, pp. 74-78. 4 figs.

The swimming movements made by fish are usually not percieved by the human eye, because they are too rapid. This movement can, however, be demonstrated with a stroboscope which has a picture frequency of 16-60 pictures per second. A very good experimental fish for this purpose is the Guppy fish (Lebistes reticulatus), which is 1.5 to 2 cm long. The fish is placed in a fish wheel (its structure is described in detail), which rotates with a speed which causes the fish to swim in place. Its movements are demonstrated on an overhead projector or photographed and observed on a stroboscope. The author describes in detail individual stages of the fish's movements and explains the structure of the fish's muscles. The muscular fish tail (which is the movement organ proper) takes up 50 % of the length of a fish's body.

201. STEINBACH, H.: Zootierbeobachtungen - Blicke in ein Schaufenster der Evolution (Observing animals at the zoo - a look into the window of evolution)
Biologie in der Schule, 30, 1981, No. 12, pp. 506-509. 2 figs.

The author informs the reader on how he teaches phylogeny factors (taught in the 10th class) at the Zoological gardens in Dresden. In order to form conditions for the pupils' independent and creative work, two worksheets have been prepared (one for the observation of birds, the other for the observation of fish, turtles and reptiles). The author also describes in detail how to use the worksheets and how to deal with them during the excursion to the Zoo.

202. SUNDBERG, M.D.: Making the Most of Onion Root Tip Mitosis
The American Biology Teacher, 43, 1981, No. 7, pp. 386-388. 1 fig. 2 tabs.

A microscopic slice of an onion root tip is usually used to study the process of mitosis. The student is asked to identify various stages of the process. The author describes two such processes, which yield more information than the experiments which are usually done. One concerns the determination of the duration of individual stages of mitosis, the second the graphical representation of cell division. The auther shows how to proceed in recording the data in a table, how to plot a graph and how to make a final assessment of the data obtained.

203. THORPE, P.: Exploring Trees in Spring
Natural Science in Schools, 19, 1981, No. 3, pp. 82-83.

Spring trees and shrubs with fresh buds and flowers are a suitable object for studying this part of the seasonal cycle. The author formulates a number of questions which concentrate attention on individual phenomena occuring in spring nature, such as the colour of buds, their shape, the fact that some buds are shiny, some are dry, while others are sticky, some are covered with fuzz and some are smooth. How are buds arranged on a branch ? How do buds of different species of trees and shrubs differ from each other ? What is the influence of light on the development of leaves and buds ? Is the bark of a tree smooth, rough or coloured ? The author describes how with the aid of waxed paper, prints of bark structure can be made. These and other similar questions lead the pupils towards observations and being able to distinguish various species of trees and shrubs in the spring.

204. THORPE, P.: Exploring Trees in Summer
Natural Science in Schools, 19, 1981, No. 1, pp. 9-12. 1 fig.

The author describes how a pupil or a group of pupils can take care of a shrub or trees growing in the vicinity of the school, which can regularly be visited. It is best to chose a single tree or shrub so that the perimeter of the crown can be measured and the tree or shrub can be better observed. The author provides a number of questions which can be given to pupils as assignments and also instructions for preserving leaves and observing changes which take place in leaves during the course of the year. A picture shows how to measure the circumference of the trunk, the crown and other indicators.

205. WANDERSEE, J.H.: A Letter from Leeuwenho
The American Biology Teacher, 43, 1981, No. 8, pp. 450--451. 2 figs.

Anton van Leeuwenhoek was a famous Dutch scientist who was one of the first to use a microscope for nature studies; he lived over 300 years ago and had no formal education, but outstanding abilities for observation. His descriptions can still serve contemporary students as an example of what can be observed. The author introduces students to Leeuwenhoek's methods of using a microscope and recommends the use of Vorticell for this purpose. Students can draw its individual parts according to what they see in a microscope and then compare these drawings to the ones made by the famour scientist. Acquainting pupils with historical studies will help to increase their interest in the natural sciences.

206. WATSON, F.G.: Tracking the Visible Planets
The Science Teacher, 48, 1981, No. 8, pp. 53-55. 3 figs.

The author discusses how to observe those five planets which are visible with the naked eye: Mercury, Venus, Mars, Jupiter and Saturn, and provides a table with calculations for their observations for the years 1980-1987. The planets can be seen on the morning and evening sky. On the basis of these observations the students should be able to answer a number of questions, such as why Mercury is so rarely visible and at such irregular intervals and why are the visible and invisible sequences of Mars much longer than of the other planets ?

207. ZAKHARCHENKO, G.G.: *Metodi nabljudeniy i uchota v opitnicheskoy rabote shkolnikh lesnichestv*
(Methods of observing and recording the work done in an experimental school forest area)
Biologiya v shkole, 55, 1981, No. 4, pp. 52-57.

The author describes the methodology of some assignments which are suitable for pupils:

- phenological observations of trees and shrubs;
- estimating the expected crop of forest seeds;
- determining the germination capacity of seeds in the soil;
- observing the seasonal growth of tree seedlings;
- observing the growth of forestry flora.

208. ZUPANC, G.K.J.: *Verhalten und Umwelt* (Behaviour and the environment)
Ein Beitrag zur Ethologie des Zebrabuntbarsches
(A contribution to the ethology of the fish Cichlosoma nigrofasciatum)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 1, pp. 26-32, 9 figs., 1 tab.

The author describes observations and experiments with the aquarium fish Cichlosoma nigrofasciatum from the family Cichlidae. Pupils study the influence of exogenous factors, such as temperature, intensity of light, amount of oxygen and carbon dioxide in water, the influence of NH_4 ions, pH values, and the influence of an increase in population density upon the aggressivness of these fishes. The outcome of the observations and experiments indicate the clear dependency of a readiness for aggression on chemical and physical factors. Various behaviour patterns, including aggression are described, as well as the correlation between elements of behaviour, changes in aggresivity depending on the environment, the effects of population density on aggression, etc. The experiments and observations are easy to carry out under school conditions.

9.8 Experimental method

209. ALTMANN, A.: Vhodný pokus k tématu vyšší nervové činnost (A suitable experiment on the topic of higher nervous activity)
Přírodní vědy ve škole, 32, 1980/1981, No. 5, p. 174.

This article provides practical advice on how to carry out a school excercise which clarifies the terms conditioned and unconditioned reflex, on the basis of the teaching of the Soviet physiologist Ivan Petrovich Pavlov.

210. ALTMANN, A.: Žákovský pokus s důkazem barevného vidění mšic (Pupil experiments to prove the colour sight of plant lice)
Přírodní vědy ve škole, 32, 1980-1981, No. 7, p. 251.

The author describes in detail how to organize experiments which will prove that plant lice see different colours.

211. BADE, L.: Überwinterung von Helix pomatia L. - Ein Unterrichtsmodell für die Sekundarstufe II
(The overwintering of Helix pomatia L. as a teaching model for the upper classes of secondary school.
Der mathematische und naturwissenschaftliche Unterricht, 34, 1981, No. 1, pp. 41-49. 3 figs., 3 tabs., lit. 19.

A strategy for survival during difficult conditions requires the complex adaptation of the organism to specific conditions provided by the environment. Especially the overwintering of animals provides an illustration of the variety of means by which animals overcome obstacles provided by the environment. The snail (Helix pomatia L.) can serve as a good example for the strategy of overwintering, which can easily be experimented with and observed from a morphological and physiological point of view. The aim of this topic is to teach pupils about different forms of overwintering in animals, the morphological and physiological changes which take place during overwintering, changes in the animal's metabolism and the course and consequences of a decline in temperature in the snail. The author also deals with where and how to find them. Overwintering in the snail is connected with changes in its blood chemistry; with lower temperatures the content of magnesium increases up to 2.5 times, while the calcium content decreases. These two elements are mutually antagonistic to each other. Changes also take place in the snail's metabolism. For short periods of time, snails will survive a temperature of - 100 °C. Experiments described concern a determination of their heart pulse frequency in relation to temperature, mounting the kidneys of summer and overwintering snails and their shedding of the epiphragma in the course of 18 days as a consequence of a wet environment. This topic, including the experiments, is planned for 6 teaching hours.

212. BAUER, P.: Die experimentelle Methode im Unterricht - ein fachübergreifendes Problem (The experimental method in teaching - the problem from the point of view of interdisciplinary relations)
Biologie in dee Schule, 30, 1981, No. 7/8, pp. 316-320.

One of the characteristics of the new teaching syllabus for the 11th class is the increased stress placed on observations and experiments. If this objective is to be achieved, it is necessary to coordinate biology, chemistry and physics teaching already from the 5th to 7th classes. The author first analyses the teaching and educational importance of experiments in the natural sciences and distinguishes experiments which have the objective of verification and those which serve as an introduction to a topic. The former makes it possible to confirm or disprove a hypothesis. The latter represent "questions" given to nature. In conclusion the author suggests a uniform approach to the experimental method. Special attention is devoted to the planning of experimental patterns, drawing up a protocol of experimental findings and how to assess them.

213. BENSON, C.L. - HOBBS, A.P. - PEGORINI, M. -
- STRUGEON, S.G. - TAPLIN, E.C.: The thermal shrinkage of dogfish fin ray collagen
The School Science Review, 62, 1981, No. 221, pp. 693-696. 2 figs.,1 tab.

The authors describe practical work which aims at studying proteins, which makes is possible to understand the characteristics of proteins and their functions, the consequences of the inactivation of enzymes and also changes which occur in non-enzymatic proteins. Experimental work of this type requires the use of an X-ray apparatus and an electrone microscope and it is time consuming. For this reason a simpler demonstration experiment is described with the fin rays of dogfish (Scyliorrhynus caniculum) or the spiny dogfish (Squalus acenthias). In the experiment, 2.5 cm long pieces of pectoral fins with fin rays of 1-2 mm thickness are heated in a testing solution at the rate of 2 °C per minute; it is then possible to observe the shrinkage of the fin rays. The collagen fibres break down under the heat, peptid chains seperate and the spiral structure disintegrates. The whole procedure is described in detail.

214. BISH, C.W.: Two tropisms in ten minutes!
The School Science Review, 62, 1981, No. 220, pp. 491-492. 3 figs., 1 lit.

A study of phototropism and geotropism is usually very time-consuming. Usually it requires long-term observations and experiments. Often during the experiment the student will just sit and wait or at best continue in a study of the theory, which is then,however, seperated from the experiment. The author describes an interesting experiment with a germinating barley seed, which is placed on a slide so that the coleoptile overreaches the long side of the slide. The slide with the seed is then placed unter the microscope and is observed with a small magnification. An eybrow pensil or a pensil for writing on glass is used to draw a line from the coleoptile to the edge of the glass. The coleoptile is then illuminated from the side with a table lamp. After 10 minutes the coleoptile will have bent in the direction of the source of the light. Besides this the tip of the coleoptile will lift upward (negative geotropism) and will no longer be in focus under the microscope.

215. BLIME, D.: Feinderkennen und Feindverhalten bei einigen Vogelarten - Freilandexperimente zur Demonstration und Analyse interspecifischer Aggression
(Recognizing an enemy and inimical behaviour in some birds species - experiments outdoors for demonstrating and analysing inter-specie aggression)
Der Biologieunterricht, 17, 1981, No. 3, pp. 45-53.
6 figs.

The author describes opportunities for observations and experiments for ethology studies of some bird species in the field. The experiments concern territorial behaviour and aggression and they use tape recordings of some bird calls (Phylloscopus trochilus, Phylloscopus collybita and Phylloscopis siliatrix) of birds who were first exposed to optical and acustic Cukoo dummies. The author then describes experiments with dummies of enemies to provoke aggressive behaviour in birds nesting in hallows and those nesting on the ground. Various types of dummy Woodpeckers were used, including stuffed birds, three-dimensional coloured dummies, and models made of paper, as well as two-dimensional models made of wood with perhaps several feathers attached and two--dimensional non-coloured models of the Flycatcher.
A similar experiment was carried out with the Nuthatch (Sitta europea), in the territory of a Lapwing (Vanellus vanellus), with the dummy of the Blue-grey heron (Ardea Cinerea) and the Stork (Ciconia ciconia). Coloured wooden dummies were at first effective, but very soon were ignored. Stuffed birds were found to be most effective. The author also describes the reactions of the Flycatcher to its enemies (the Strike - Lanius collurio, the Roller - Coracias garrulus and the Barn owl - Athene noctua). Various types of aggressive behaviour are described against enemies, for instance the

Lapwing against the Heron and the Stork (aggressive flight and preening) which serves to distract the enemy from the nest.

216. BOWKER, D.W. - MUIR, H.J.: Algal Bioassays in Water Pollution Studies
Journal of Biological Education, 15, 1981, No. 1, pp. 35-41. 4 figs.

Water pollution is a popular and important component of the teaching program concerning the environment. The experiments which are usually suggested are mostly too complicated for school conditions. For these reasons the authors suggest a tested school experiment with algae - Selenastrum capricornutum PRINTZ - which provides a relatively simple and reliable method for studying the effects of polluted water on growth in free waters. The details of the experiment which are described make it possible to exactly assess the influence of a specific water sample on the algae. The method can of course also be used for other kinds of algae.

217. BREIDING, R.: Transportmechanismen der Zelle-Versuche für den Biologieunterricht (The transportation mechanism of the cell - experiments for biology teaching)
Der mathematische und naturwissenschaftliche Unterricht, 34, 1981, No. 5, pp. 302-303.

The author describes some experiments concerning plant physiology which concern the transporation mechanisms of cells. The experiments described in the article are not cited in textbooks nor in the most often used handbooks for physiological experiments. The author describes not only an experiment with an original object (peat moss), but also experiments with models concerning the principle of ion loss and the mechanism of ion transmission. The first experiment with peat moss demonstrates semi-permeability of the cellular wall which is important for the transportation of substances to a cell.The cell wall also plays an important role in the selective adsorption of ions. Some of these experiments are a bit complex and require substantial knowledge in chemistry, but they can be done. They provide logical explanations when combined with chemical knowledge (interdisciplinary relations).

218. BUKATSCH, F.: Absorptions- und Wirkungsspectrum der Blattfarbstoffe. Ein Kapitol angewandter Photo- und Biochemie (The absorption and emission spectrum of leaf colouring. A chapter in applied photo-chemistry and bio-chemistry)
Naturwissenschaften im Unterricht - Biologie, 20, 1981, No. 2, pp. 53-55. 3 figs.

The author, on the basis of simple procedures and without special apparatus, demonstrates opportunities for experiments with colouring substances in leaves and with an absorption and emission spectrum. Instructions are provided for making a chlorophyll extract, separating its yellow and green components, demonstrating the absorption long-wave component of light, the absorption of the short-wave component of the spectrum, the use of a Sachs test after exposing Garden cress leaves to the sun under colour foils (red, yellow, green, blue) and with a subsequent starch test which makes it possible to compare an emission and absorption spectrum.

219. CALUSNITZER, H.J.: Die Assel im Unterricht (The use of Isopoda in class)
Naturwissenschaften im Unterricht, 29, 1982, No. 5, pp. 129-134. 2 figs., 2 worksheets.

Isopoda, such as wood lice or pill bugs (Asellus aquaticus, Porcelio scaber and Armadillidium vulgare), can easily be collected in nature and kept in school. They are found in dark damp places, under the bark of trees, under stones or in damp basements. The author describes how they can be used for ecological and ethological experiments done by pupils. A special box can be used with dry and damp chambers. These animals are important for disintegrating the mass of fallen leaves and are among the few animals able to digest cellulose. Experiments can include determining their choice of food, the fact that they have scototaxis - seeking out dark places in the environment. The last group of experiments deals with how wood lice curl up into a ball when irritated. All experiments can be undertaken with very simple school equippment.

220. FREELAND, P.W.: Watercress (Rorippa nasturtium aquaticum): small-scale cultivation and use in water culture experiments.
The School Science Review, 63, 1981, No. 223, pp. 277-280. 3 figs., 3 tabs.

The author recommends the use of watercress as a suitable plant for various physiological experiments in school. It can be easily acquired either in seeds or it can be bought as a vegetable. The seeds will flower in 6-8 weeks after planting and the plant has extensive regeneration abilities. A Sachs cultivating medium can be used and a solution made with pH tablets. The number of leaves grown in solutions with pH factors of 4 - 6,4 - 7,0 - 7,4 - 7,6 - 8,0 - 9,0 can be studied and the results put into tables and mathematically assessed. Another series of experiments concerns cultivating watercress in solutions where some ions are lacking and the effect of a loss of ions is studied. The number of leaves, their weight at the beginning and end of the experiment and the net increase in weight are recorded. By supplying all the required mineral ions we can increase the weight of the watercress up to nine times.

221. KLEFFMANN, S.: Temperaturregulation beim Menschen - ein Experiment zur Einführung des Regelkreises in Klasse 10 (Temperature regulation in man - an experiment with a closed selfregulating system in the 10th class)
Der mathemtische und naturwissenschaftliche Unterricht, 34, 1981, No. 3, pp. 173-174. 3 figs.

The regulation mechanisms in the human organism and in its environment are of great importance. The article deals with the problem of human temperature regulation. To understand the problem, pupils must understand such terms and notions as sugar levels in the blood and the concentration of hormones in the vegetative system, as well as thermoregulation. For the regulation of human temperature a relatively simple system has developed. Experiments should aim at determining changes in temperature, the relation between cause and effect, and finally at developing a generalized model of the regulation cycle. In the experiments, observations can be carried out with the aid of a mini--sauna, where a hair drier is used to increase the heat in a plastic bag for 5 minutes and then the temperature inside the bag is measured, as well as the body temperature of the experimental person in the mini-sauna, his pulse and the colour of his skin. The duration of the experiment including measurements and their assessment requires approximately 10 minutes.

222. GOSPODAR, U.: Operante Konditionierung am Beispiel des Y-Laufes (Operational conditioning on the basis of the example of a Y-shaped racing-course)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 1, pp. 1-4. 3 figs.

Ethology is now taught in the schools as part of the biology curriculum, and it has also found its way into textbooks. However, teaching media for ethology are so highly demanding that they tend to decrease the liklihood of being used by pupils. The author describes a simple teaching medium for studying animal ethology in schools - a racing-course with a Y shape. The entrance to the racing-course should have a door which can be closed. A Golden hamster is then placed in the racing-course and left for 24 hours without food. The first part of the course is 50 cm long and its height and width are 6 m. At a crossroads there is a fork in the course and each branch is 75 cm long, with the same width and height. The crossroads should have a cover made of plexiglass, so that pupils are able to follow the hamster's behaviour. The conditions of the experiment are that the hamster is rewarded when he takes the right branch and is punished when he takes the left branch (by a slight blow or a squirt of water). The reward is in the form of cereal grains. The pupils plot the outcome on a graph. During the first day the hamster learns to chose the right road after 23 attempts and the second day after only 17 attempts. The experiment lasted for 10 to 15 minutes. When the conditions of the experiment were changed and the hamster was rewarded when it took the left-hand branch of the course, the animal was unable to change its behaviour even after 65 attempts.

223. GREBEL, D.: Sauer Zellsaft - mit blauen Anthocyan-Farbstoff (Acid cell sap with blue anthocyanins) Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 5, pp. 146-148. 2 pictures.

Blue anthocyanin pigments from the sap of various flowers is based on anthocyanidine non-ferrous metal complexes which are called chelates and which develop in a slightly acid solution with trivalent metal cations and anthocyanidine which contains at least two neighboring -OH groups. The following phenomena can be demonstrated with simple means and during several seconds: cell sap provides a slightly acid reaction, while the exchange of cations frees the cations of red anthocyanidin from blue anthocynin and when lye is added blue chelates again develop in the slightly acid solution; the forming and disintegrations of chelates which form the anthocyanidine complex is reversible. Trivalent Al^{3+} cations and Fe^{3+} ions with two neighboring -OH groups include for instance cyanidine, delphinidine, and pesumidine. Any two of these anthocyanidines in an acid solution of a metal cation form a blue chelate complex. The forming of chelate is explained on the basis of the example of cyanidine. Some anthocyanidines, such as gerandine, peonidine and malvidine are unable to form chelates and thus remain red. When in nature they are found together with blue chelates they form purple coloured flowers. The author describes experiments where a water extract of flower petals is used, the freeing of anthocyanidine cations from natural chelates takes place, as well as the forming of chelates from the freed cations of anthocyanidines and the renewal of freed cations of anthocyanidine from the formed chelates; in a strongly acid solution blue anthocynidin does not form.

224. HILL, E.C.: A Microbiology Experiment for Schools
Journal of Biological Education, 15, 1981, No. 2, pp. 96-99. 4 figs.

Some teachers are reluctant to do practical microbiological experiments in a school laboratory. The author here describes simple, but very clear microbiological experiments whose purpose it is to produce yoghurt with the use of Lactobacillus bulgarious and Streptococcus thermophilus obtained from commercially sold yohgurt. Besides a microscope and a blender only very little else is needed and the author describes in detail procedures, as well as methods of testing and interpreting the outcome of the experiments. The experiments are safe and there is no need for strile instruments.

225. HOFF, H.: Qualitativer und quantitativer Nachweis von Saccharose aus Blütenpflanzen (Quantitative and qualitative proof of the presence of saccharose in blooming plants)
Praxis der Naturwissenschaften im Unterricht - Biologie, 30, 1981, No. 1, pp. 6-10. 6 figs.

The author here describes an interesting and somewhat demanding experiment for use in the upper classes of secondary school, which concerns the qualitative and quantitative determination of saccharose in phanerogamia. The experiment concentrates on plant physiology and the chemistry of food processing. Experiments concern the extraction of saccharose from plant material, the analysis of this extract on the basis of paper chromatography, describing individual sucroses, the elution of saccharose from the chromatography paper and the quantitative measurement of saccharose. Also the relative sweetness of various sucroses are measured: 100 % for sacchrose, 74 % for glucose, 173 % for fructose, 60 % for maltose and 27 % for lactose.

226. HUBER, F.: Nervöse Grundlagen des Verhaltnis (The nervous foundations of behaviour).
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 12, pp. 356-369.

A new scientific discipline is now developing, somewhere between ethology and neurobiology. It is called neuro-ethology and it bridges the areas dealing with the behaviour of animals and with the functioning of the nervous system in animals. The author demonstrates these problems with the aid of observations and experiments concerning the acustic communication of the cricket. The singing of the male can be demonstrated as well as the response of the female (phonotaxis), and new discoveries made in this area together with an enumeration of as yet unanswered questions in this context can be discussed. Insects are especially suitable for this type of study. They are distributed in all habitat niches found on Earth, the number of insects is huge both as far as species and individuals are concerned, the behaviour of the majority of insects is constant (attitudes and movement) and they can easily be analysed. Insects also have very simple triggering mechanisms (a ladder-like nervous system) and this makes it easier to study them.

On the example of the cricket (Gryllus campestris), an insect sound repertory is studied: in the male courting singing, enticing singing and rival singing. The response of the female can also be studied: phonotaxis means that the female follows the male on the basis of his singing. The cricket produces its "singing" by a specific movement of its wings, where the left wing is always above the right wing. Its sound frequency in enticing singing is 4000 to 5000 Hertz, in courting singing it is 3 times greater, i.e. 13 000 to 15 000 Hertz. The frequency of rivalry singing is equal to the frequency of enticing songs. Also the neural basis of a cricket's singing, as well as its motor patterns (genetically determined behaviour), inborn triggering mechanisms (sensory templates), its readiness for action (motivation), central generators (some constant rhythmic patterns of behaviour), transmitters of excitation (nerve cells with neuropeptids) and phonotaxis, as well as the response of the female to male singing can all be studied by the pupils.

227. KONDRICK, R.E.: How Plants Make Light Work of Growth

Journal of Biological Education, 15, 1981, No. 2, pp. 85-89. 5 figs.

The article deals with photogeny and photomorphogeny which from the point of view of the biology student are not only aspects of plant physiology and the biochemistry of plant ecology, but can also serve to illustrate general principles of photobiology and developmental biology. An exposition and examples of experiments concerning the effect of sun radiation on plants and the clear diagrams concerning the distibution of the sun's spectrum and the effects of night darkness, as well as an exposition of the function of photochromes and plant pigments and the effects they have on the behaviour of members of the animal kingdom form the final part of the article.

228. KLOB, W.: Elektrophorese von Eosin und Methylenblau - ein ergänzendes Experiment zur Untersuchung der Bodenkolloidladung (The electrophoresis of eosine and methylene blue - a supplementary experiment for studying the charge of soil colloids)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 12, pp. 381-382. 3 figs.

A supplementary experiment is described to show the existence and movement of both the above cited compounds in an electrical field. The colour components of methylene blue are found in the negative part of the experimental apparatus, i.e. the colour carrying the ion in the methylene blue has a positive charge. With eosine the opposite is true, the colour-beering ion has a negative charge. Both experiments demonstrate that effects observed in garden soil can be explained on the basis of electrical voltage phenomena. The red negative component of eosine remains without any effect and the blue positive component is adsorbed, so that soil colloids must have a generally negative voltage. When positive voltage has been adsorbed, positive carriers of voltage must be flooded out on the opposite side. Thus soil colloids have the function of changing ions.

229. KRIEGER, K.G.: Phytohormongestreuerte Organenbewegungen bei Gemüsebohnen - eine einfache Messmethode für Schülerexperimente (Movements of kidney bean organs increased with plant hormones - a simple method for measuring pupils'experiments)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 3, pp. 65-73. 9 figs., 2 worksheets.

In the upper classes of secondary school phytohormones can be a suitable topic for experiments in plant physiology. The author describes experiments concerning this topic where the kidney bean (Phaseolus vulgaris) is used as a suitable object and several experiments with the Black locust tree (Robinia pseudoacacia); among greenhouse plants he also uses Mimosa pudica. The phytohormones of indolylacetate acid, naphtyloacetate acid, 2,4-dichlorfenoxiacetate acid and naphtyloacetate acid are used. Experiments with the growth movements of plants (auxins), where a coleoptile test is done to demonstrate growth, as well as experiments with movements caused by turgor, the pattern of leaf distribution, phototropism and seismonastic movements are all described. Experiments for determining typical enzymatic kinetics are described, as well as curves to describe the effect of various doses of phyto-hormones. Plants are tested for various auxins, and their daily exogennous rhythm is studied, together with variation movements (auxin effects). All experiments are described in detail, including instructions for measurements and experiences with this type of work in biology practical excercises.

230. LANGE, G.: Beobachtungen an Protoplaste[illegible]r pflanzlichen Zelle von Trametes versicolor nach enzymatischem Abbau der Zellwand (The observation of protoplasts in the plant cells of Trametes versicolor after the enzymatic breakdown of the cell wall) Biologie in der Schule, 30, 1981, No. 11, pp. 476-478. 3 figs.

The purpose of experimental intervention into Trameles versicolor is to make possible an analysis of cellular components. This experiment can be used when teaching how cells are organized, as well as when comparing animal and plant cells. Trametes versicolor are club fungi, of the family Polyporaceae; their cultivation is very simple. The enzyme for breaking down the cell wall (cellulase) can be obtained from the snail. Approximately 10 - 15 mg of dry enzyme is dissolved in 1 cm^3 of a 0.15 molar phosphate butter to which 12.5 % of saccharose have been added. To observe the freed protoplasts, young culture are best. The mycelium is covered with an enzym solution and after 5 to 10 minutes the first protoplasts can be observed.

231. LIEBEL, V.: Modelový pokus s přírodními koacerváty (A model experiment with natural coacervates) Přírodní vědy ve škole, 32, 1980/1981, No. 7, p. 251.

This is an instruction for carrying out a laboratory excercise which is suitable for the 4th (final) class of a general education secondary school or the 3rd class of schools where the experimental verification of the new approach to biology instruction is now being prepared.

The article is concluded by the formulation of the problem of the difference between droplets of protoplasma and oil and their relation to the surrounding water environment.

232. MARENČÍK, A.: Možnosti experimentálného študia fotosyntézy rastlin v školských podmienkach (Opportunities for the experimental study of photosynthesis under school laboratory conditions)
Přírodní vědy ve škole, 32, 1980/1981, No. 2, pp. 42-44. 1 fig.

The author describes practical excercises which deal with the topic of photosynthesis. He first characterizes the term photosynthesis and then methods which determine the intensity of photosynthesis in terrestrial plants and cultivated plants. The best method is the gravimetrical method, where the quantity of assimilates per unit of area of assimilated tissue is determined on the basis of weight. The practical application of this method under school conditions is described in detail.

233. MAY, J.C.: Myths I Have Taught
The Science Teacher, 48, 1981, No. 4, pp. 23-25. 3 figs.

The author here warns all science teachers to be careful and not make the same mistakes the author himself has made and which are described at length. This especially concerns experiments which have been repeated for decades in all schools, such as the burning of a candle in a glass standing in a bowl of water, sulphur which grows thick when heated, as well as experiments to determine whether rubber is porous, why white paint is white, etc. An analysis of these experiments indicates that what has been considered as axiomatic is no longer true and that often the opposite of what was actually shown by the experiment was taught.

234. MÜLLER, M.: Orientierungsmechanismen wirbelloser Tiere - Versuche zu Thigmotaxis und Thigmokinese
(The orientation mechanism of invertebrates - experiments with haptotropism and haptokineses)
Praxis der Naturwissenschaftn - Biologie, 30, 1981, No. 1, pp. 15-25. 4 tabs., 1 worksheet.

The wood lice Porcellio scaber and Oniscus asellus of the Isopoda order are suitable objects for ecological and ethological observations and experiments. The author describes methods for breeding these animals in schools. These experients are suitable for the final classes of secondary schools and some of them for institutions of higher learning. The experiments concern haptotropism (or thigmotaxis), haptokinesis, thanatosis (pretending to be dead), the turning reflex, photokinesis and the hydrokinetic influencing of haptotropism and haptokinesis. The experiments and observations can be carried out with simple means.

235. MÜLLER, K. - KAFKA, J.: Samočistící schopnost vodních nádrží a toků - jednoduchý experimentální důkaz
(The self-cleansing abilities of water reservoirs, rivers and streams - simple experimental proof)
Přírodní vědy ve škole, 32, 1980/1981, No. 1, pp. 8-10.

The reader is acquainted with a simple long-term experiment, which a teacher can undertake with his pupils and assess the findings. This is a model experiment which proves the self-cleansing abilities of river water. The experimental method accents the educational impact of biology as a teaching subject by stressing environmental conservation.

236. OXLADE, E.L. - CLIFFORD, P.E. : *Experiments in Geotropism*
Journal of Biological Education, 15, 1981, No. 2,
pp. 137-142, 3 figs.

Tropism is the spontaneous movement of some plants in the direction of the source of excitation. The authors here describe some experiments with the reaction of plants to excitation caused by the Earth's gravity - geotropism. For practical school purposes the authors recommend the use of the plant Teraxacum officinale, placed in a horizontal position in a test tube with a cultivating medium. Geotropism from a theoretical point of view can then be demonstrated practically and pupils can carry out various measurements and make diagrams, etc., which is shown in the article.

237. PATTERSON, D.J.: *The Behaviour of Cilia and Ciliates*
Journal of Biological Education, 15, 1981, No. 3,
pp. 192-202., 10 figs., 2 tabs.

An extensive study which deals with protozoa of the sub-phylum Ciliata of the class Ciliates. These organisms are compared with flagellates (Flagellata). The article is accompanied by numerous photographs made with an electrone microscope and with carefully made diagrams. The structure of these protozoa are described in detail, their mechanism for movement and a microscopical cross-section of a flagella, which is an organ of movement. Also three experiments with a paramecium are described which do not require any special apparatus and are thus suitable for school purposes.

238. PFEIL, H.: Wir stellen die Vergiftung des Bodens fest (We find the soil is poisoned) Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 2, p. 55.

The environment along highways and roads is especially strongly polluted. In their vicinity the soil concentrates an increasing amount of poisonous substances, such as oil, substances from the exhausts of motorcars and salt used to de-ice the road. These substance influence the edaphic environment and especially soil organisms. The author recommends experiments to prove the presence of poisonous substances in the soil along highways. One such experiment uses worms. A flower box size 60 x 12 x 12 cm is used to gather samples of the soil from the vicinity of a highway. Holes in the bottom make it possible to drain off water from the sample. The box is then divided into five parts, with samples of soil taken from 1, 2, 3, 4 and 5 meters from the highway. Then 15 worms are found and three worms are put into each section. The sections are at first divided from each other by wooden partitions, but as soon as the worms dig into the soil the partitions should be removed. The flower box is then covered with a plastic foil. After 24 hours we place copper plates on both short sides of the flower box and attach a 20 V power source, which causes the worms to emerge out of the soil. It is thus possible to determine the number of worms found in various parts of the flower box and draw conclusions concerning the quality and pollution of the soil in relation to its distance from the highway.

239. ISTERER, J.: Schulversuche zum Schwoazverhalten von Fischen (School experiments with forming schools of fish)
Der mathematische und naturwissenschaftliche Unterricht, 34, 1981, pp. 480-486. 4 figs., lit. 39.

Some species of fish are characterized by behaviour which maintains very small distances between individual fish, so that schools of fish are formed. The forming of schools is developed to various degrees in various specie of fish, it can also be influenced by the environment of the fish. The author explains how this type of fish behaviour can be made use of for school observations and experiments and for learning basic ethological terms and notions. The forming of schools or herds exists among numerous species, especially those which live in very large biotas (such as marine fish or odd-toed and even-toed mammals in the savannah). Life in a group provides animals with a natural cover and a certain degree of protection against enemies (predators and birds of prey), as well as maintaining shortest routes of escape. Animals which live in schools or herds are often characterized by so-called somalytic colouring, which in a specific environment merges the outline of the body with the background and provides thus greater protection. A densly packed school of fish makes it more difficult for the attacking predator to aim at an individual, the predator usually is capable only of catching individuals which stray from the school or herd. Life in a school or herd also makes reproduction easier, since the school or herd will have individuals of the same age and same degree of sexual maturity and hence the liklihood of an available mate is greater. The fish of the open seas (for instance herrings), have

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schools which function as reproductive communities. It is interesting to study the attitude of the school or herd towards a new member. Minnows, for instance, will accept a new member into their school only if he is of the same size as the others and does not differ by more than 12 mm. Within a school, intraspecie agressive behaviour decreases. In large schools no leading animal or social hierarchy exist. The author describes various specie of aquarium fish which are suitable for school observations and experiments concerning the ethology of the school. The fish include Poecilia reticulata, Xyphophorus maculatus, Cheirodon axelrodi, Hyphesobrycon flammeus, Brachydanio nigrofascitus, Aphyochrax rubrioinnis, Barbus tetrazona and Gymnocorylus fernetzi. The experiments concern the confusion effect in a school of fish, testing the various intensity of forming schools in different specie of fish, the influence of a round vessel, the quantitative mediation of appetence by the school for the individual, the reaction of fish to the sudden appearance of a larger fish and a demonstration of the specie-specific behaviour of the group in a school of fish. The experiments require an aquarium with 80 - 100 litres of water, which is as shallow as possible, so that it prevents the fish from escaping too deep.

240. POENICKE, H.W.: Warum sind Zellen klein ? - Modellversuche zur Bedeutung der Zellgrösse für den Stoffaustausch und Stofftransport (Why are cells small ? Model experiments concerning the significance of the size of cells for metabolic functions and the transportation of substances).
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 5, pp. 139-142. 2 figs.

The transportation and exchange of substance in a cell (its metabolism) are made more difficult, the larger the cell is. The size of the cell is limited in both directions. As far as the smallest cells are concerned, they must include a minimum number of molecules needed for autonomous metabolic functions. These require approximately 100 enzymes, as well as molecules of DNA, RNA, ribosomes, water and a plasmatic membrane. Some bacteria, mycoplasma and rickettsias achieve this minimum. On the other hand an increase in the size of cells leads to difficulties in metabolic functions and with transportation within the cell. Clear and simple experiments with a jelly cube, which can easily be stained and divided into smaller cubes, can show pupils that in the smaller units the transportation of substances (in this case the staining agent) takes place much more quickly than in the large unit. The outcome of the experiment can be assessed mathematically.

241. POHL, H.: Demonstrationsexperimente für die Stoffeinheit Wachstum und Individualentwicklung, Klasse 9 (Demonstration experiments concerning the topic Growth and individual development, in the 9th class). Biologie in der Schule, 30, 1981, No. 7/8, pp. 301-302. 2 tabs.

According to the teaching syllabus for the 9th class the pupils are supposed to learn about the regulation of growth processes in plants achieved with the aid of hormones. Experiments can help to correctly understand these processes. Sodium 2,4 - dichlorphenoxyacetate as a synthetic auxin can very well be used for this purpose. The coleoptile of a grain of maize (corn) or barley can be used. The author describes in detail the organization of the experiment and the method used for assessing the findings.

242. REUTER, G.: Genetische Experimente (XIV). Die Demonstration der geschlechtschromosomengebundenen Vererbung in Versuchen mit Drosphila melanogaster (Genetic experiments XIV. A demonstration of heredity linked to sex in Drosphila melanogaster) Biologie in der Schule, 30, 1981, No. 1, pp. 39-44. 5 figs.

An advantage of the experiments suggested in the article is the fact that they make it possible to demonstrate the chromosome theory of heredity. The diploid number of chromosomes in Drosophila melanogaster is 8; of this number the female has two X chromosomes and the male an X and Y chromosome. The X and Y chromosomes are not identical from the point of view of heredity, the genes carried by the X chromosome are not found in the Y chromosome and for this reasons mutations of the X chromosome in males are always phenotypical manifestations. The author then describes suitable experiments for demonstrating both X and Y chromosomes. The mutants w, y, m and g are suitable for demonstrating the X chromosome; the author however, deals only with the w mutant (white eyes). Experiments to demonstrate the presence of the Y chromosome are more difficult, since they require a genetically marked Y chromosome. This is hardly possible to do in school and it is thus necessary to acquire experimental objects from a college or university. All the mentioned experiments require a temperature of 20 °C and a period of 28 to 30 days.

243. ROWAN, A.N.: Animals in Education
The American Biology Teacher, 43, 1981, No. 5, pp.280-282.

The use of animals in laboratory experiments or for the observation of their behaviour under specific situations is still a matter of contraversy among biology teachers ecologists and humanitarians. The moral and scientific aspects of the problem, as well as educational aspects, are discussed at various conferences, as well as in literature and in films where often the anthropomorphisation of animals takes place, as if animals acted as people do (for instance the lioness Elsa in Born to be Free). The author of the article here sums up the most important opinions voiced at different conferences and found in the relevant literature by educators, as well as scientists concerning the use of animals in teaching the natural sciences. The conclusion he comes to is that animals represent a positive contribution to instruction, but they should be the object of care and attention not only in the course of the experiment, but all the time they are in the school. For this reason teachers above all should have the education and skills needed for the correct care and use of experimental animals and this basic knowledge should also be passed on to pupils.

244. SCADDING, S.R.: How to Culture Chicken Embryos in Petri Dishes
The American Biology Teacher, 43, 1981, No. 7, pp. 382-383, 396. 1 fig.

Chicken embryos are often used for experiments in biology instruction. They are especially popular for demontrating the embryo development of vertebrates, In view of their size and the fact that they are not too sensitive they can be cultivated in Petri dishes, where it is easy to follow their development. The author provides complete and proven instructions on how to begin the experiment, which conditions must be maintained and finally how to carry on the experiment. Also recommendations concerning the final assessment of the experiment are provided.

245. SHELTON, C.B.A.: Nerve and Muscle Responses in Sabella penicillius L., a Reliable Electrophysiological Preparation Suitable for Use in Schools
Journal of Biological Education, 15, 1981, No. 1, pp. 59-64. 4 figs.

The author describes the required apparatus and best methods for simple electrophysiological experiments. Sabella penicillius is robust and there is no need to carry out a selection. Electrical charges arouse large and pure nerve and muscular depolarization which is reflected in the behaviour of the animal The required apparatus is not expensive and can be made in a school workshop. This method has been tested for a period of three years by biologists at Oxford, who have found it very successful.

246. SCHMIDT, V.: Genetische Experimente (XV). Reisenchromosomen im Suspensor der Gartenbohne (Genetical experiments XV. Giant chromosomes in the suspensor structure of the kidney bean)
Biologie in der Schule, 30, 1981, No. 5, pp. 219-222. 5 figs.

Plants have giant chromosomes in cells which are highly active from a metabolic point of view. In the course of ontogeny the specialization of cells takes place and the number of chromosomes increases (somatic polyploid development). This is made possible by imperfect mitosis, the fusion of nuclei and endomitosis. Chromosomes which have developed from endomitosis from the initial chromosome (so-called endochromosome) have a trend towards pairing off and thus giant chromosomes develop. They can be observed in the suspensor of beans Phaseolus vulgaris and Phaseolus cocinena L. Young beans of various age(8-16 cm long) are cut and placed in 70 % alcohol. It is then possible to find in the embryo tissue whose cells are of a conspicuous size (this is the suspensor). They can be mounted and stained for about 1 hour with acetate carmine at room temperatures. The giant chromosomes can then be observed.

247. SCHMUDE, J.: Clinical Urinalysis: Implications for Teaching
The American Biology Teacher, 43, 1981, No. 3, pp.165-167. 3 figs.

A urine analysis is a diagnostic procedure used to determine a patient's health. The analysis provides information on the function of the kidneys, the incidence of some diseases occuring during pregnancy and also drug abuse. The technique used for clinical analysis can also be used in laboratory excercises by biology students. The author describes procedures which can be used in school, under conditions which to a maximum degree approach those of the clinical laboratory, including microscopical analysis. The students achieve a better understanding not only of this particular topic, but also how other biological and chemical analyses needed in diagnostics and treatment are done.

248. SCHNEIDER, H.: Zur Demonstration neuronaler Schaltprinzipien. (A demonstration of the neuronal switching on principle)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 4, pp. 112-119. 3 figs., 4 tabs., 3 worksheets.

The author describes a 3-lesson teaching unit which deals with receptors (sense-organs) in the skin and their importance, function and distribution. On the basis of simple experiments with a brush and pin pupils determine the position of various tactile and thermal receptors in the skin, the distance at which a person is capable of distinguishing 2 points on the skin, etc. The pupils record what they observe in a table. The author provides detailed information on what is needed for these experiments and how the findings should be processed. This type of work is suitable for the lower and upper classes of secondary school, as well as for basic school.

249. SCHULTE, H. - WOLF, B.: Die Pollenkeimung (The germination of pollen)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 8, pp. 263-266.

The author describes experiments he has done and recommends suitable plants for experiments with the germination of pollen and a demonstration of pollen tube: the flowers Touch-me-not (Impatiens sultani or Impatiens walleriana) and the African violet (Saintpaulia). Both are indoor plants which bloom for relativaly long periods and form large quantities of pollen. Their pollen has a high germinating capacity and they provide it in sufficient quantities. Sugar should be used in the experiment for the germination of pollen tubes; it has the function of a chemotropic substance and is also osmotically effective. With Impatiens sultani we can use cane or beet-root sugar in concerntrations of 3.4, 5.5, 7.5, 10, 12.5, 15, 20, 25 and 30 %. With pure water and with a low concentration of sugar there is a danger that as a consequence of osmotic processes the pollen grains will burst (a strong water intake in a hypotonic environment).
A sugar concentration of 10-15 % is best. The pollen grains used in the experiment will germinate in a suspended drop even in a covered microscopy specimen. The first pollen tubes appear after 10 to 15 minutes. After 30 to 45 minutes all stages of germination of pollen grains are available. The specimens with pollen grains must not dry out. For microscopy purposes magnifications of 10:1 with an eyepiece of 10 are sufficient.

250. SCHULZ, K.H. - ZSCHIPE, C.: Bau und Funktion der Sprossachse - Naturobjekt demonstriert (The structure and function of a stem - demonstrations on an original object)
Biologie in der Schule, 30, 1981, No. 9, p. 376.

In the topic "The structure and metabolism of the higher plants" in the 9th class, the teaching syllabus requires, besides microscopy observations of a stem cross-section, also experimental proof of water conducted by the stem. An experiment undertaken by students with a Touch-me-not flower submerged in an eosin solution is described. But besides Touch-me-nots also 0.5 cm slices of the stem of a wild elder can be used. The experiment takes 5 - 8 minutes. The advantage of the wild elder is that a mere magnification glass is sufficient to observe the structure of the stem.

251. SCHWARZ, E.: Quelling quantitative Einsatzmöglichkeiten für Analysenwaage und Mikroprojektor (Swelling from a quantitative point of view - the opportunity for using an analytical balance and a microprojector)
Der Biologieunterricht, 17, 1981, No. 4, pp. 27-44, 7 tabs., 8 figs.

Swelling and germination are included in all teaching syllabi and botany textbooks used in basic and secondary schools. Observations and experiments concerning this part of the physiology subject-matter can easily be carried out at all times of the year and do not require any special apparatus. The author has made these experiments more scientific so that pupils become acquainted with scientific methods of studying biological phenomena and that they become acquainted with the use of an analytical balance and a microprojektor. An analytical balance makes it possible to observe and measure swelling in terms of mg. Microprojection makes is possible to work with 30 pupils in a class at the same time. The subject-matter is divided into two-lesson periods. It is assumed that pupils already have knowledge concerning the calculation of percentages and are able to use a logarithmic ruler. During the work the pupils become acquainted with the structure of a seed, insemination, a cotyledon, plant embryo, swelling, germination and other factors. Problem teaching can be achieved by giving pupils the seeds of the beans Phaseolus vulgaris vulgaris, Phaseolus vulgaris nanus and Phaseolus vulgaris aborigineus, as well as the seeds of Garden cress (Lepidium sativum) for various assignments. The rapid increase in weight (due to water) in the Water cress seeds is caused by the fact that the plant adjusts to a dry environment in the semi-desert or desert conditions in the Near East and Central Asia, where the plant comes form. Water cress germinates in the course of several hours. The outcome of the observations can be graphically represented and mathematically processed by the pupils.

252. SCHWARZENBACH, A.M.: Ein weiteres Schülerexperiment zum Thema "Rauchen" (Another pupil experiment on the subject of smoking).
Naturwissenschaften im Unterricht, 29, 1981, No. 2, pp. 58-60. 2 figs.

The experiment described in this article demonstrates the negative effects of tobacco smoking in a very simple manner and leads pupils to the conclusion that tar is a very resistant substance, which is a great burden to the lungs of the smoker. An old and often washed towel can be used for the experiment. A pupil who smokes, puffs tobacco smoke through a piece of the towel or through a clean handkerchief. The pupils are then given the assignment of washing out the tobacco stain with the help of water, soap, detergent or any other washing medium. To make the stain, 3 to 5 cigarette puffs are sufficient. The stain will not be washed out even with very aggressive washing media (caustic soda, hydrochloric acid). The washing should be done with 20, 30 and 40 °C water. The pupils can also attempt to wash out the stain with alcohol, acetone and hydrogene chloride. Tar is insoluble in water and is resistent against all cleansing media. A single cigarette burdens the lungs of the smoker with 3 billion molecules of tar. In conclusion the topic should be summed up and those diseases which are associated with smoking should be pointed out to pupils (for instance cancer of the lungs).

253. STEAD, D.E. - MOTTLEY, J.: A simple technique for demonstrating the role of ethene in fruit ripening The School Science Review, 62, 1981, No.221, pp. 700--704. 1 fig., 1 tab., lit. 8.

The role of ethene for the ripening of fruit has been known for a long time. Even a very small quantity of this gas (approximately 0.1 cm^3 in 100 dm^3 of air) already speeds the ripening of fruit by changing the metabolism of the majority of succulent fruits. With the help of ethene it is possible to exactly time the ripening of fruit found in warehouses. The authors describe experiments which can be carried out in school. Samples of fruit are placed in polyethylene bags together with 25 g of vermiculite and 25 g of potassium permanganate and control samples are left in the open air. Both samples are placed in a dark place at room temperature. The number of days required before the fruit is ripe are measured. Bananas, avocado pears, papaya, lemons, oranges, mango, peaches, guava, tomatoes etc. are all suitable for these experiments.

254. TARWID, K.: Patyczaki jako material do eksperymentow nad ekologia populacji (The Phasmidae as material for experiments in population ecology)
Biologia w szkole, 34, 1981, No. 3, pp. 166-168.
2 photos.

The stick insect (Phasmidae) provides suitable material for experiments in population ecology. With it we can study ecological phenomena which are typical for a dense population of individuals who are of the same age or of different ages. The insect can easily be bred in school, it is polyphagous, so that it is easy to acquire food for it the year around. They breed without seasonal interruptions also in captivity. They provide genetically homogenous material which reproduces by parthenogenesis. The eggs hatch in 3 to 6 months. Experiments can be done by measuring the growth of the stick insects and increases in their weight. They can be bred in fairly small vessels (25 x 25 x 25 cm). The author describes observations which concern the development of the individual, as well whole populations.

255. THOMPSON, T. - POLLAK, I.: Using the Blue Gourami in Ethological and Embryological Studies
The American Biology Teacher, 43, 1981, No. 2, pp. 96-97.
2 figs.

The Blue gourami is a tropical fish which belongs to the Osphronemidae. It is well suited for school experiments, including the one described in det by the authors, where students can observe the behaviour of the fish and at the same time observe under a microscope the developing embryo in specific intervals of time. Histological observations of embryos can be carried out in several ways with good results. The cost of the experiments are very low.

256 TROMMER, G.: "Biogas" - Methangärung im Unterricht
("Biogas" - methane fermentation in teaching)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 5, pp. 139-146. 7 figs.

Methane fermentation of organic waste is well known in the form of slurry and foam which emerge from water treatment plants. This fermentation can very simply be demonstrated in biology instruction in school. Waste is treated by aerobic processes (in composting or total mineralization) or by anaerobic methods (decay where organic substances rich in energy remain in the environment). Methane fermentation and its utilization is studied by bio-technology. Methane fermentation has two stages which lead to the forming of methane, an anaerobic acid phase when the waste decays and an anaerobic alkaline phase of decay. Methane is formed by methane bacteria. During the first stage of methane formation optimum temperatures are 35 °C. The thermophilous methane bacteria's physiological optimum temperature is 55 °C. Mesothermic methane bacteria are very sensitive to changes in temperature, within the limits of ± 2°C. For this reason decaying tanks in treatment plants which produce methane must be heated with thermostatic heating to an optimum temperature. The best environment for methane fermentation is slightly alkaline with a pH factor of 7.2 - 7.5

(this stage is called the attractive). The author describes a simple decaying vessel for use in school, how it operates and how to assess output readings.

257. WARDLE, K. - SHORT, W.C.: Induced Stomatal Responses in Epidermal Strips
Journal of Biological Education, 15, 1981, No. 2, pp. 117-122. 9 figs.

The development of the stomata is probably the most important anatomical development in evolution, since it contributed to the fact that the Earth was covered with higher plants. It is now known that stomata are sensory organs which cause a fluctuating resistence between the internal atmosphere of the leaf and its environment. The authors describe a study of epidermal strips from a vetch to determine the function and reaction of the stomata. This study indicates the key role of potassium in the osmosis which takes place in the stomata, the reaction with carbon dioxide and also how normal reactions can be influenced by hormones. These experiments require very simple apparatus and are suitable for the upper classes of secondary school.

258. WOLF, B. - BURGER, A.: Demonstration des Primäreffektes der Photosynthese (A demonstration of the primary effects of photosynthesis)
Der mathematische und naturwissenschaftliche Unterricht, 34, 1981, No. 4, pp. 228-233, 7 figs., lit. 7.

To demonstrate the primary effect of photosynthesis the authors recommend the use of a simple experiment in which stress is place on redox (reduction + oxidation) potential. In the experiment, photo-potentials are calculated on the basis of light effects. The oxidative dissimilation of glucose is known as a strongly exo-energic reaction, while assimilation and the forming of glucosis from CO_2 and water is a strongly endo-energic reaction. The authors describe the apparatus needed for this experiment, as well as how to record and assess the output of the experiment.

259. YOUNGGREN, N.A.: Thyroid Hormones and Amphibian Metamorphosis
The American Biology Teacher, 43, 1981, No. 1, pp. 21-25. 5 figs.

After many tests it has been found that the larvae of frogs and newts can be forced to make the metamorphosis into adult animals more rapidly if thyroid gland hormones are added to their water. The author develops this finding in a school experiment, which is rather extensive but attractive for students. Attention is given to the preparation of the hormone and its correct dosage. Also the correct number of larvae must be placed in an experimental aquarium with the correct amount of water. The experiment usually lasts from two to four weeks, depending on the temperature of the water and the concentration of the hormones used. The experiment can then be repeated with the use of other additives (for instance iodine) and its influence on the metamorphosis of the larvae observed. Similar expriments can beplanned with the use of insect larvae.

260. ZIPKO, S.J.: The Influence of Tobacco and Drugs in the Behaviour of Brine Shrimp
The American Biology Teacher, 43, 1981, No. 2, pp. 76-81. 1 fig., 2 tabs.

The author describes a school experiment with the Brine shrimp where the pathological effects of tobacco and drugs on the body of the animal can be demonstrated.

The physiological and chemical effects of these substances are here shown on the basis of a simplem organism. The author also discusses the ethical aspects of experiments on laboratory animals. Last but not least the purpose of the experiment is also to provide support to anti-smoking campaigns. The experiment is done by the pupils themselves, under the supervision of a teacher, on the basis of instructions prepared ahead of time.

261. HAHN, M.: Didaktische Möglichkeiten eines Stoffjahresüberblickes (The didactical opportunities provided by an annual survey of teaching material)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 3, pp. 88-91. 2 tabs.

The author stresses the didactical significance and also the opportunity provided by undertaking with pupils a repetition of everything taught during the year at the end of the school year. Such a survey improves motivation and the attitude pupils have towards learning and it helps them to gain an overview of everything they have learnt in the course of the year. They are able to generalize all the things they have learnt about individual plants and animals and to train logical thinking, as well as the use of scientific methods. Such repetitions also improve the activity of pupils in class and they achieve a better understanding of the spiral nature of the structure of the teaching syllabus.

10. Biology instruction media

262. PUGAL, N.A.: Ob uchebnom oborudovaniyi po biologii (Concerning the availability of biology instruction media)
Biologiya v shkole, 22, 1981, No. 3, pp. 20-23.

The inclusion of this chapter into the new improved teaching syllabus indicates the fact that the use of teaching educational media will have an important role to play in biology instruction. Basic teaching media represent the foundation for implementing the curriculum and teaching syllabi. For the 11th 5-year-plan, List No. 11 will be issued which will contain a total of 630 various objects for biology instruction (of this number, 130 will be made available during the course of this five-year plan). Some of these objects will be modernized. One of the specific characteristics of biology instruction is that is deals with natural objects, especially for laboratory work. For this purpose cards containing instructions for various experiments will be published, so that with their help pupils can work independently. Also new models (for instance concerning the structure of the cell) will be made, as well as reliefs and a series of slides which will be produced for teachers, called "A Biology Classroom" together with a book called "Biological Terminology".

10.1 Individual types of media and their importance

263. DUPEK, F.: Zkušenosti učitelů 1. stupně z práce s učebními pomůckami (The experience of teachers at the elementary level in the use of teaching adis)
Učební pomůcky ve škole a v osvětě, 20, 1980/81, No. 2, pp. 19-20.

In the course of the school year 1979/1980 the first stage of the transition of the Czechoslovak school system to the new teaching and education system was completed. Teachers at the elementary level in the majority of cases have already taught all four years of this level and at the end of the school year 1979/1980 all districts organized discussions to assess the experiences gained with the new model of instruction after 4 years. It was found that the demanding tasks of the new model cannot be fulfilled, if new teaching media are not provided. The article deals with teaching media in mathematics, the Czech language, music education, art education, physical education, the natural sciences and the subject introduction to basic knowledge. As far as the latter two subjects are concerned, the article criticises some shortcomings found in film cassettes and positively assesses worksheets whose number should be increased. For natural sciences the article assesses in a positive manner aids for the following topics: The human body, The structure of animal bodies, The structure of plant bodies, as well as an atlas of plants. Not all schools have at their disposal the new animal atlas. Also the detachable pages of the atlas should made of better quality material.

10.11 Studying the didactical value of media used in biology instruction

264. IWON, W.: Naturobjekte im Biologieunterricht (Natural objects in biology instruction) Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 6, pp. 190-191.

From the history of the didactics of biology we know that the first to point to the importance of natural objects (either live or mounted) in biology instruction was August Lüben (1804-1873) and especially Otto Schmiel (1860-1943), who stressed contacts of pupils with natural objects in biology instruction. The author provides a survey of the use of natural objects in biology teaching in the schools of the FRG: 52 % of teachers expressed the opinion that an original object is absolutely necessary, 63 % of teachers, however, said that in the course of the last month they had not used any original object in class, 85 % said they did not use any animal, ever. The use of natural objects in biology instruction is important for motivating pupils, for the use of activating methods (observations and experiments), for increasing the activity of pupils during instruction (usually substitutes for original objects are not as effective). On the other hand instruction which uses an original object at all costs also contains certain dangers; when seeking answers and solutions to problems, the activity of pupils tends to be hindered.

265. SZYMANSKA, E. - OSTAS, Z.: Z badań nad wykorzystaniem środków dydaktycznych w nauczaniu biologii w klasie V. (On research concerning the use of didactical media in biology instruction in the 5th class)
Biologia w szkole, 34, 1981, No. 4, pp. 231-234. 2 figs.

In the school year 1979-1980 the Institute for School Curricula carried out a research project at 19 experimental schools to determine how didactical media are utilized in biology teaching in the 5th class on the basis of the new textbooks. The purpose of the project was to determine which didactical media should be provided for the new model of biology instruction in the 5th class and to what extent they aré utilised when they are available. The project also established the degree to which schools have at their disposal various teaching aids for biology and whether they are found in lists of media, recommended by the Ministry of Education. The project included the following topics from the teaching syllabus: Methods and techniques used for observing nature, The characteristics of a living organism, The variability of algae, The variability of forms in invertebrate, Environmental conservation. It was found that approximately 2.3 to 5.2 teaching media per lesson are required. However, schools have these media to varying degrees. Teachers themselves demand more modern teaching media and aids, especially for difficult topics.

10.2 Original live objects

266. SILBERSTEIN-TAMIR: Factors which affect student´s attitudes towards the use of living animals in learning biology
Science Education, 65, 1981, No. 2, pp. 119-130. 5 tabs.

The increased stress placed on the use of living animals has replaced the previously predominant descriptive method of instruction. Many students profere this type of instruction to "second hand" learning. The purpose of this study is to identify those factors which influence the attitude of students towards the use of live animals, especially the differences in attitudes towards their use in research and in school, the attitude of students towards situations where the animal in question suffers or is killed, as well as differences between boys and girls in this respect. The findings of the project are summed up by the authors in tables.

10.21 Original objects in the environment

267. FRITSCHEK, D.: Kalender für Biologielehrer (A calendar for biology teachers)
Biologie in der Schule, 30, 1981, No. 7/8, pp. 303-307.

The purpose of this calendar is to help teachers who do not have much experience in the organization of experiments and in the gathering of material suitable for them. The calendar does not provide answers to the questions of "what" and "how", but only "when" natural objects should be gathered and experiments begun. In the tables provided in the article, this problem is divided into months and classes (5th to 9th).

268. HAMON, H.M. - ALLEN, W.L.: A readily constructed extraction apparatus for removal of soil anthropods from soil samples
The School Science Review, 62, 1981, No. 221, pp. 696-699.
2 figs., 4 lit.

Ecology also uses various soil samples in its studies. This is connected with the study of the organisms found in the edaphic soil layer. These studies have recently become very popular. They require a special apparatus which makes it possible to select those organisms from the soil sample which are required. Soil organisms are very small and cannot simply be taken out with a pair of pincers. The simplest and most effective method of separating anthropods is sought. This is made more dfficult by the fact that also the eggs, larva, pupa and imaga of various insects are found in the soil. The apparatus for this purpose described in the article is derived from a Salt-Hollick apparatus, which was developed already in 1940. A description of how to make this apparatus is provided, as well as 2 drawings and a photograph of the finished product.

10.26 Breeding animals in schools, breeding facilities, collections of animals. Calendars for collecting fauna

269. ALTMANN, A.: Sběr a chov hmyzu pro výuku zoologie v 6. ročníku základní školy (The collection and breeding of insects for biology instruction in the 6th class of basic school)
Přírodní vědy ve škole, 32, 1980/1981, No. 9, pp. 325-330.

The article deals with opportunities for collecting insects for the gradual forming of zoological collections in schools and making multiplicate specimens which can be used for various purposes. The author also deals with the problem of which kinds of insects to use, which can be kept alive and their didactical use. All specie of insects which are found in the teaching syllabus and in the textbook are dealt with (the Libellula, Grass-hopper, Cricket, Locust and others). For each specie the author cites observations which pupils can undertake during the course of practical excercises.

270. ANDRONOVA, Y.A.: Selektsiya krolikov (The selection of rabbits)
Biologiya v shkole, 55, 1981, No. 6, pp. 61-65.

A series of articles concerning the breeding of rabbits here continues with problems of their cross-breeding. Parts of the article are devoted to a description of Soviet breeds of rabbits which are suitable for experiments in pupil hobby clubs.

271. BUCKEL, C.B.: Tarantulas in the Clasroom
The American Biology Teacher, 43, 1981, No. 3, pp. 161-163.

Large hairy spiders have always drawn the attention of enthusiasts, but none is more popular than the tarantula to which many old myths are linked, such as the untrue claim that a tarantula bite is dangerous and can cause extatic dancing in its victim. The author describes this very interesting spider as an experimental animal which can be bred in a glass vessel in class, how it feeds, its digestion, its shape and the function of its external organs, including the hairy cover which serves as a receptor of air vibrations. Each tarantula must be kept seperately in view of the cannibalistic propensities this spider has.

272. HAMILTON, T.R.: Platyfish: Versatile Animals for the Laboratory
The American Biology Teacher, 43, 1981, No. 8, pp. 426-429, and 472. 4 figs.

The article contains a description of the aquarium platyfish (Platypoexitus maculatus, Gunther, 1866) which can serve to increase students' interest in biology instruction. The author describes the anatomical, physiological and genetic characteristics of the fish, its behaviour during reproduction and the movements of males before copulation. The author's students used these fish for various assignments, such as describing their feeding habits and their behaviour as determined by social hierarchy.

273. HILL-COTTINGHAM, M.P.: Collecting Earthworms
Journal of Biological Education, 15, 1981, No. 3, pp.185-186.

The author describes an interesting method of collecting Earthworms. The teacher divides his students into two groups. One group stamps its feet on a lawn, which causes the worms to come to the surface, while the other group collects them, without harming them. They can then be classified and stored for later biological experiments in the school laboratory. This method, which does not use chemicals, is best suited for school purposes.

274. MININA, I.S.: Nekotoriye biologicheskiye osobennosti i razvedeniye krolikov (Some biological specific aspects of the multiplication of rabbits)
Biologiya v shkole, 55, 1981, No. 1, pp. 63-64.

The article describes briefly the basic biology (including anatomical and physiological specific aspects) of the rabbit and methods used in their breeding. Also specific data concerning their weight, increments in weight and recommended floor space devoted to their breeding are cited. The article Kak viraščivat molodnyak krolikov (How to breed young rabbits) which is a continuation of the present one, was published in Biologiya v shkole, 55, 1981, No. 2, pp. 68-71.

275. BASHKOVA, S.: Sbirare, zapozvane i opiti za regeneratsiya pri planiriyata (The collection and breeding of and experiments with the regeneration of Planaria)
Biologiya i khimiya, 24, 1981, No. 3, pp. 28-32.

In the first part of the article the author deals with the methodology of collecting various Planaria. Next she describes the preparation of microscopy specimens and finally topics for experiments concerning their regeneration abilities.

276. SESTINI, V.A.: Biology Culture Bank - A Growing Investment
The Science Teacher, 48, 1981, No. 2, pp. 24-26. 1 fig.

Providing fresh biological material for various school experiments and laboratory work is often very difficult, especially when the material is not readily available. The author solved the problem by founding, together with his students, a school garden where the students cultivate the needed material, including micro-organisms, which the whole school can use. The school saves money for buying the material and the students learn to appreciate the hard work which goes into the cultivation of anything.

277. WENSKE, E.: Unterrichtsmittel mit Naturobjekten
(Teaching media and natural objects)
Biologie in der Schule, 30, 1981, No. 6, pp. 239-244.
7 figs.

Fresh natural objects are indispensable for biology instruction. Hobby clubs in schools can contribut to collecting or breeding them. The author cites the breeding of insects (for instance Blaberus and Clitumnus) as suitable for this purpose. The pupils make boxes in which all stages of the imago and other stages of insect development are shown. Another hobby club which is devoted to graphic art and printing helped to prepare texts for the boxes. The final teaching aids were distributed to 35 different schools.

10.27 Cultivating plants. Hydroponics

278. FRÄNZ, D.: Pflegeleichte Topfkultur in der Schule
(Easily cultivated potted plants in school)
Der mathematische und naturwissenschaftliche Unterricht, 34, 1981, No. 4, pp. 236-243. 7 figs., lit. 5.

Instruction requires fresh material for use in class, such as plants, the year around. Various aquatic plants and plants cultivated with the aid of irrigation systems make this possible. The author provides detailed instructions concerning the work which pupils can do in this area, so that it is possible to carry out various observations, experiments and to learn skills related to biology. Also problems connected with the cultivation of plants in the absence of the gardener, for instance during shool vacations are discussed. Again the solution are aquatic and irrigated plants. The article describes how to proceed in propagation by cutting and various irrigation systems.

279. LOPEZ, L.M.: Hydroponics - Studies in Plant Culture with Historical Roots
The Science Teacher, 48, 1981, No. 6, pp. 47-49. 2 figs.

The author describes how a teacher can demonstrate and apply scientific principles related to the growing of plants with the aid of hydroponics. She first acquaints the reader with the history of hydroponics, its pioneers and the recepies for various cultivating media. An important part of the article enumerates the conditions which must be maintained if plant cultivation with hydroponics is to be successful (temperature, air circulation, pH factor, etc.). Also which vessels are most suitable is discussed. In conclusion the author enumerates places in South and North America where the cultivation of plants with hydroponics is done commercially, or where this method is being prepared (Israel, some Arab countries).

280. KRIENITZ, D. - KRIENITZ, L.: Selbstgewonnene Algenkulturen als Untersuchungsobjekte im Unterricht und in der Arbeitsgemeinschaft (mit Bildbeilage) (Do-it-yourself Algae cultures as suitable research objects in instruction and in hobby clubs. With appendix of illustrations)
Biologie in der Schule, 30, 1981, No. 7-8, pp. 308-316.
2 figs.,8 tabs.

Algae cultures made by the pupils themselves can be used in biology instruction in various ways, for instance in the 7th and 11th classes and also in hobby club activities. The authors first describe how to cultivate the Algae, the needed facilities and the preparation of a cultivating medium and soil, as well as how to seed the Algae, etc. Then the article describes the main species of algae which can be cultivated in agar. These include representatives of Blue-gree algae, Diatoms and other kinds of Algae.

281. PIETROPAOLO, P.: Plant Tissue Culture
The American Biology Teacher, 43, 1981, No. 9, pp. 202-505.
7 figs.

This article deals with cloning, an asexual method of multiplying plants in the artificial environment of a test tube with a cultivating medium. The author's practical recommendations concern its use in school, where students can achieve interesting results while at the same time learning. The author cites the required equipment, as well as the demandes made upon material, light, temperature, humidity and nutrition, up to the final planting of the plant in the soil of a mini-glass-house. A number of photographs show the process from the beginning. Practical work done by the students reinforces what they have previously learnt theoretically.

282. SLOBODYAN, I.M.: Sirengariy na shkolnom uchebno-opitnom uchastke (Lilacs in the school garden devoted to study and research)
Biologiya v shkole, 55, 1981, No. 3, p. 53.

Even one lilac bush is sufficient to cultivate several varieties of lilacs which are both biologically and aesthetically interesting. The cultivation of lilacs is not difficult. Pupils can try seeding (June-July) and grafting (in the spring). Also grafting with green grafts can be interesting. In this method leaves are shortened and the whole graft is subsequently covered with a plastic bag.

10.271 A school plot of land, botanical garden, young natural scientist station, school biology centre

283. BRIEME, H.: Rasen und Wiesen (A lawn and meadow)
Praxis derNaturwissenschaften - Biologie, 30, 1981, No. 8, pp. 244-246. , 2 figs.

In earlier times almost all of Europe was covered with forests and grass or meadow plants grew only in places not suitable for trees and shrubs. In recent times the problem of founding grassy areas and meadows on public or private land in and around housing-settlements is again of interest. Grassy areas for sports are being developed, as well as decorative lawns and meadows with typical flora and fauna communities, which are relatively extensive, and have various mutual relations which can be studied. The author describes individual types of grassy areas and the factors which influence their healthy development.

284. DYLLA, K.: Alte Wallkecke als Gartenbegrenzung
(Old hedgerows for the demarcation of gardens)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 8, p. 253. 2 photos.

The suburb of Lehnerz near the city of Fulda in the FRG still has three old hedgerows. They serve as very good isolation against street traffic and dust and they form a welcome environment for birds, which find here not only places for building nests, but also seeds and fruit. The hedgerows are formed mostly by Hawthorns, Wild elder, Hip rose, Sloe and Wild pear. Their fruit provides welcome food for birds especially in the autumn and winter. The author describes in detail these and similar hedgerows, the species of birds which live in them, etc. He stresses that the only way to maintain these hedgerows is to avoid all chemical treatments.

285. KLEVENSKAYA, T.M. - KROPOTOVA, I.I.: Botanicheskomu sadu MGU - 275 let (The Botanical Gardens of the Moscow State University are 275 years old)
Biologiya v shkole, 55, 1981, No. 5, pp. 19-23.

Czar Peter I founded on an area of 6 hectars a garden for the cultivation of medicinal herbs, which later became the nucleus of a botanical gardens. Only in 1951 was another botanical garden founded in the vicinity of the Biological and Pedological Faculty of the University. At present both parts of the Botanical Gardens have a collection of 1500 specie of tropical and sub-tropical flora and approximately 6000 specie of flora from the temperate zone. The Gardens function in teaching, in scientific research and in the popularization of biology.

286. LAAN, L.Y.: Iz opita organizatsii rabot na uchebno-opitnom uchastke (Concerning experiences in organizing work on experimental and study plots of land)
Biologiya v shkole, 55, 1981, No. 2, pp. 66-68.

Specific experiences with the organization of work on a 3 hectar plot of land belonging to a school have been very positive. Of this total area, 1.68 hectars are devoted to experimental and garden plants. Decorative shrubs and trees are planted in the vicinity of the school. The school plot of land proper is divided into several parts: the plots for lower classes, a systematics section, a section for morphology and plant propagation, for vegetables, a section for general biology, etc. Each plant cultivated on the plot has its own schedule for carrying out various work. The article cites examples of activities done with 1st and 7th class pupils.

287. MAJECKA, Z. - NOWAK, L.: Rola ogrodu szkolnego w nauczaniu biologii (The place of the school plot of land in biology instruction)
Biologia w szkole, 34, 1981, No. 2, pp. 102-107. 2 tabs., 1 test.

The teaching syllabus for biology also contains sections which are important for the polytechnical education of pupils. These include work done on the school plot of land. This type of education is especially important in agricultural and rural areas, since it helps to teach pupils basic knowledge in agrobiology, contributes to their vocational and educational guidance and influences the making of a vocational choice and selecting a field of study. Various activities concerning plant physiology, ecology and plant genetics can be done on the school plot of land.

Pupils can become acquainted with plants and taxonomic units. Work on the plot of land combines theory and practice and the plot becomes a green laboratory. This work also has a positive effect on classroom biology instruction. For this reason some biology teachers conduct some lessons directly outdoors on the plot of land. It was found that in these cases pupils have 14 % better knowledge than in schools where the same topics were taught in a traditional manner in the classroom. The authors describe in detail the outline of two such teaching lessons carried out on the school's plot of land. The first is called "Work done before the onset of winter" and the second "The influence of the depth of planting on the growth and harvest of radishes".

288. SCHWARZ, U.: Schüller legen Naturgartenen (Pupils establish natural gardens)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 8, pp. 250-252.

The author provides information on how pupils, on the basis of a detailed plan, founded a school garden at the canton school at Solothurn in Switzerland. The garden contained only such plants and trees which grow wildly in Switzerland; there are no representatives of tropical or subtropical plants. It also includes 163 plants which have become domesticated in Switzerland. In the future the pupils plan to increase the number of such plants to 100. Also a number of domestic animals live in the garden. This trend is beginning to become very common among schools and private gardens throughout the world.

289. **WEIGER, H.:** Der Boden - unersetzbarer Lebensraum
(The soil - an irreplacable living environment)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 8, pp. 236-244. 2 figs., 3 tabs., 1 stencil for drawings.

The soil contains 90 % mineral components and 10 % organic components, which in turn are composed of 80 % dead plants and animals which form humus, 15 % of the roots of living plants and 5 % flora and fauna living in the soil; of this number 40 % are algae and fungi, 40 % are bacteria, 3 % mesofauna and 17 % macrofauna (of this number 12 % are earthworms). The living component of the soil (microorganisms, flora and fauna) is found in the edaphic layer. The article also describes the most important soil fauna and its importance for the circulation of matter in the soil and in nature in general. This information is then used for discussions on the care and conservation of the soil in school gardens, in dealing with waste produced by the garden, making a composte and using it for fertilisation.

290. **WINKEL, G.:** Das Schulbiologiecentrum in Hannover
(A school biology centre in Hannover)
Naturwissenschaften im Unterricht- Biologie, 29, 1981, No. 2, pp. 48-52. 5 figs.

A school biology centre for all the schools found in Hannover has been in existence for 20 years. Its purpose is to serve for demonstrations and to facilitate biology instruction. The article provides a survey of the centre's tasks, organisation, how it provides schools with various materials, describes the courses it organizes for biology teachers, as well as pupils, its activities in the area of enviromental conservation, etc. The centre provides activities for pupils from the 6th to 10th classes. It has two botanical gardens (at Burg and Linden) and a zoo. It has a permanent staff of 35, including a director, 4 teachers, 1 zoologist, 3 secretaries, 2 gardening specialist and 5 gardeners, 15 gardening helpers, 5 educators and 2 cleaning women. The facility has 1000 m^2 of hothouses, and works with 135 schools in the city, for which it provides material (plants and animals), provides them with aid as far as their own school gardens are concerned, organizes hobby club activities for pupils, further education courses for teachers and also contributes to public civic activities. It has 28.199 plants in flower pots, 117 aquariums, 130 cages for animals, 489 small cages, 124 guinea pigs, 1037 laboratory mice, 186 ant communities, 12600 plants in nurseries and 7750 plants in flower beds. This centre has become a model for similar centres in other cities.

1.272 Exhibitions

291. OLCZYK, B.: *Wystawa prac pozalekcyjnych w Łodzi* (An exhibition of extracurricula work in Łodź) Biologia w szkole, 34, 1981, No. 5, pp. 310-311.

An exhibition of extracurricula work done by pupils of basic and secondary schools was held in the city of Łodz. Among the objects exhibited were various didactical media for biology instruction made by pupils, botanical and zoological collections, photographs, slides, models, monographs, records of various nature activities, various activities connected with environmental conservation, chronicles of biology Olympiads, samples of various essays and seminar work done by pupils, as well as various models of flowers, organs of the body and exotic flora and fauna.

10.273 Museums

292. TSOLOVA, I.: Prirodonauchniyat muzey v pomoshch na uchitelite-biologi (Nature study museums can help biology teachers)
Biologiya i khimiya, 24, 1981, No. 2, pp. 60-62.

The main role of all nature study museums is to increase pupils' interest in nature and nature conservation. Also a number of biology topics can be taught in an improved manner when cooperation with a museum exists. This concerns especially the following topics: The development of organisms; Molluscs of the Tertairy seas; Insects; Vertebrates, etc. Excursions can be organized during the course of biology lessons. But this requires proper preparations by the teacher who should visit the relevant expositions beforehand. The author cites methodological comments for specific biology lessons undertaken in this manner, which can be taught directly in the museum.

293. EBRER, D. - GÖTTERT, E.: Biologieunterricht im Naturkundenmuseum - Eine Untersuchung zum Stand der Museumpädagogik (Biology teaching in a natural science museum. Research on the state of museum education) Der mathematische und naturwissenschaftliche Unterricht, 34, 1981, No. 3, pp. 129-139, 3 tabs., lit. 15.

Many natural science museums aim their exhibitions at their most frequent visitors, i.e. school children and secondary school students. But many museums still continue to offer material which concerns only systematics and morphology. Close cooperation between museums and schools requires a knowledge of the teaching syllabi used for biology instruction by schools on the part of the museum staff, so that exhibitions can offer material relevant to this context. Some museums are already using modern techniques to these ends (audio-visual aids, macro-slides, multivision, etc.). The article provides detailed information concerning a research project to determine the educational work done by museums in the FRG, where there are 145 such museums, in the GDR (6) and 19 different museums in Great Britain, Australia, Denmark, Finland, Sweden, Switzerland and the USA. All these museums recieved a questionnaire with items to determine the number, status and objectives of museum educators, the concept of the work material they provide (such as worksheets for pupils, etc.), cooperation between museums and schools, the space available for teaching purposes, etc. Of 145 museums in the FRG, 95 responded. 27 have special areas for pupils and teachers and only 5 museums provide pupils with special materials. 25 museums have special educational staff. In recent years this educational staff in museums has been increasing. Cooperation with schools has led to special exhibitions being organized (on such subjects as heredity, the development of life on Earth, the behaviour of animals, nutrition and obesity, the adaptation of organisms, problems concerning the environment, evolutionary theory and ecology). Also the methodology used by the exhibitions has changed. In many museums pupils are able to carry out experiments, observations, to use a microscope, mount specimens, learn how to exhibit various objects, etc.

294. SHOWELL, J.P.M.: Science and the Early Iron Industry
Natural Science in the Schools, 19, 1981, No. 1, pp. 2-6, 9 figs.

Coal and iron ore mining began the industrial revolution in the 19th century. Original technical facilities which have been preserved as historical monuments in the town of Coalbrookdale (about 4 hours by car from London) show how coal and iron ore were mined. The author describes these facilities in a very interesting manner and also provides photographs and drawings of the underground shafts, of the furances used to smelt the iron ore together with anthracite, which gradually replaced charcoal. The whole vicinity of Coalbrookdale is today an extensive museum which deals with early mining and ferrous metalurgy techniques used in England and can serve pupils from the lower grades as an introduction to the study of iron and steel production. The outline drawings in the article were done by pupils of a secondary school in Telford.

10.52 Microscopy specimens of animals and those pertaining to the biology of man

295. GILL, B.F.: Teaching lung structure - the use of thick sections of dried rat lung
The School Science Review, 62, 1981, No. 220, p. 492.

Schools now have available a special method for studying the internal sponge-like structure of lung tissue. The lungs of a rat are very well suited for this purpose and the specimen thus produced can then be used for a number of years. The mounted specimen can be studied with the aid of a magnifying glass or with smaller magnifications under a microscope. A pipette is placed into the trachea of excised lungs and air blown into them and then the trachea is tied up. The blown up lungs are then dried in dry air at 100 °C over-night. When dried, the lungs can be cut into strips 1 mm thick and placed on a slide into a drop of clear glue and covered with a window slide. The glue penetrates the three-dimensional strips only in a limited manner. The mounted specimen must be kept in a dry place. If stored properly, it will not spoil and will last a number of years.

296. TRANTER, J.A.: Blood Sampling in School.
Journal of Biological Education, 15, 1981, No. 1, pp. 19-21.

Practical work with fresh blood samples can be a very valuable component of biology instruction, but taking blood samples from pupils is questionable. Nevertheless, the author express an opinion in favour of taking these samples, since he considers it important that the pupils actually see all that can be learnt from a single drop of blood and that they also learn how to use this very valuable material.He is, however, aware of the dangers posed to pupils' health and therefore describes in detail how to sterilise instruments according to the standards set by the Ministry of Public Health and some other specific problems connected with the taking of blood samples.

10.61 Models

297. FOOTE, M.A.: Recognising Spatial Relationships in Biology
The Science Teacher, 48, 1981, No. 2, p. 31, 2 figs.

One of the most important concepts which a beginner student of biology must understand is the relationship between longitudinal, tangential and transversal sections and the organism or structure as a whole from which the section comes. The author provides instructions on how to facilitate visually an understanding of the position of various sections on the basis of a model which the students can make themselves either out of modelling clay or some more permanent material. All difficult concepts and notions become easier to understand on the basis of models.

298. HIRSFELD, D.: Modell zur Erarbeitung von Evolutionsabläufen (A model on the course of evolution)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 7, pp. 209-216. 8 figs.

The teaching of general biology and genetics, which concern the evolution of species, often suffers from a lack of suitable teaching media. The author here describes the use of simple models for the simulation of evolution and some other partial phenomena connected with evolution, such as isolation in evolution. The model is easy to make and the author describes its specific use in various classes of secondary school in the basic and specialized biology courses.

299. JAENICKE, J.: Mitose und Zellteilung - einfach projiziert (Mitosis and cell division - simple projections)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 9, pp. 284-288. 6 figs.

Mitosis and cell division are taught as basic biological phenomena both in the lower and upper classes of secondary school, even if they are studied at different depths. For understanding these notions and concepts, which are in themselves very complicated, schools usually have at their disposal pictures, photographs and microscopy specimens. The author here suggests making schematic drawings based on actual microscopical specimens, which can then be projected with an overhead projector during classwork. These drawings simplify and generalize individual stages of mitosis and make it easier to understand the essence of the phenomenon. The author also suggests making a wire model of a chromosome and describes the use of this functional model in class. It has the advantage of stressing the physiological shape of the chromosome, the condensation of chromatin nuclei (nucelofilaments), their coiling, the structure of the chromosomes, the distribution of the chromatin in the course of the anaphase and the pairing of the chromatids before the beginning of mitosis and hence the interphase between two mitoses. With this model it is not possible to show the molecular structure of the chromatim threads made of DNA, histons nor complexes of histons, the three-dimensional nature of chromosome division, the transport of daughter chromosomes to the poles of the cells, the structuring of a centromere as the place where the spinolle is attached and the forming of a cellular membrane in the course of cellular division. Some of the elements can, however, be inserted into the model subsequently. The article provides detailed instructions on how to build the model.

300. JOHNSTONE, A.H. - MAHMOUD, N.A.: Pupils Response to a Model for Water Transport
Journal of Biological Education, 15, 1981, No. 3, pp. 203-218. 5 figs.

The problem of osmosis presents certain difficulties even for students of the upper classes. The authors have designed a simple dynamic model of the process of osmosis, which will help pupils to understand the basis of this phenomenon; they become acquainted with osmotic pressure, diffusion, the process of dissolution and the molecular processes which take place in solutions. The data cited in graphs is based on methods which pupils of the upper classes should already know. There are also diagrams of "comprehensibility' tests"done with pupils concerning the model proposed by both authors.

301. KLOB, W.: Modelaufgaben zur Stammentwicklung für Grund- und Leistungskurs Biologie (Model assignments concerning phylogeny in the basic and special biology course)
Praxis der Naturwissenschaften - Biology, 30, 1981, No. 11, pp. 346-349. 4 figs., 1 transparency.

The authors have drawn up assignments on phylogeny for basic and specialized biology courses for the upper classes of secondary school. The assignments are based on 28 drawings of imaginary (non-existing) animals, which the pupils are asked to put into sequences on the basis of the laws of evolution, according to the instructions provided by the teacher. The author explains in detail how to work with this interesting model.

302. NASH, P. - EPP, G.J.: The Bacteriophage: a Functional Model for Demonstrating a Viral Life Cycle
The American Biology Teacher, 43, 1981, No. 5, pp. 269-271. 3 figs.

Viruses play an important role in our daily lives because they influence our health. Virology is still undergoing rapid development, so that students are usually unable to describe the functions of viral particles. Viruses can be observed only through an electronic microscope, which is not available in secondary schools. Also models of viruses are very expensive. The author describes the making of such a model which could be used in instruction; it is made of inexpensive material and can be used to demonstrate the life functions of a virus. A photograph of the model makes the author's instructions very clear.

303. RÖLL, K.: Mathematische Modelle in der Populationsgenetik (Mathematical models in population genetics) Praxis der Naturwissenschaften - Biolcgie, 30, 1981, No. 1, pp. 1-5. 2 figs., 3 tabs.

The author demonstrates the validity of the Hardy-Weinberg law concerning the division of genes in a population which is left to itself. This law is based on the basic laws of probability theory. Gene division can be graphically demonstrated with the aid of an isosceles triangle in which we can study changes in population on the basis of selection. The course of the selection is determined on the basis of mathematical equations and the outcome of these calculations can then be compared with the actual division of genes into various daughter generations. The author here uses geometrical methods and his examples are taken from human genetics and include the problem of heredity in deaf-mutes in Japan and the problem of sickel-cell anemia among Negroes in the USA.

304. PAWELZIG, G.: Den Schülern das Verhältnis von Modell und Wirklichkeit bewusstmachen ! (Pupils should become acquainted with the relationship between a model and reality !)
Biologie in der Schule, 30, 1981, No. 12, pp. 525-526.

Models in teaching were in use long before the term model became so fashionable. The basic characteristic of a model is its one-sideness - this is a positive, as well as negative trait and for this reason making generalisations on the basis of merely a model should always be cautions. Hence the main problem is not the use of the model itself, but rather the purpose it serves.

305. SCHMIED, G.: Der Pawlowsche Hund - als elektronisches Modell (A Pavlovian dog as an electronic model)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 4, pp. 120-124, 4 figs., 2 tabs., 1 drawing.

An electronic model of a Pavlovian dog has been made for the teaching of human biology in secondary school; the model represents the conditioning of a dog to a sound signal which causes the excretion of saliva. The model has two versions; the first shows a simple model of connecting paths by which conditioned reflexes are formed, while the second model simulates a Pavlovian dog on the basis of a suitable computer program.

306. SCHNEIDER, H.: Quantifizierender Einsatz von Modellen im Biologieunterricht - aufgezeigt am Beispiel der menschlichen Wirbelsäule (The quantitative use of models in biology instruction - demonstrated on the basis of the human spinal column)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 8, pp. 259-263. 6 figs.

On the basis of the example of the evolution of man and changes in the human skull and spinal column, the author demonstrates the possibility of using morphological and functional models for teaching human biology, in connection with the subject work education. Such an approach is in accord with contemporary endeavours of specialists in the didactics of biology. Teaching human biology with the active participation of the pupils forms the prerequisites for learning concepts and terms which lead to an understanding of the subject-matter. Morphology thus becomes very important, especially when it is combined with a stress on functional components and when instruction is problem-orientated. Biological models used in connection with teaching human biology are of a generalised abstract nature because they leave out anatomical details. In this way they make it possible to clarify essential functions.

307. WINDE, P.: *Menschliches Bewusstsein und Erziehungswissenschaft. Zur Bedeutung von Hirnforschung und Erkenntnistheorie für die Modellmethode in der Umwelterziehung* (Human consciousness and science education. Concerning the significance of the study of the brain and cognitive theory for the model method in education towards environmental conservation)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 9, pp. 257-267. 10 figs.

Human thinking is in fact thinking in models. The original is replaced by a model. For science education models should represent the original in the mind of the pupil. Decisive functions should be identical in the model and in the original. The model should be comprehensive, dynamic, and variable in the sense of agreement existing between the original and the model; hence the possibility of utilizing this characteristic in instruction. At present computer simulation is used for such models, for instance in simulating the ecological relationship which exists between carnivorous animals (predators and birds of prey) and herbivorous animals (which are the prey of the former). The author stresses the need to use both hemispheres of the brain, whereas contemporary schools make use of only one half - in right-handed people the left hemisphere. The question is whether contemporary society can afford this only one-sided education of the young generation without harmful effects.

308. WOOLMAN, C.H.: A simple tidal system
The School Science Review, 62, 1981, No. 220, pp. 494-496. 1 fig.

The author here publishes the model of a simple system, which makes it possible to demonstrate the utilisation of the alternation of high and low tide. The apparatus includes two 50 l aquariums connected with a system of siphons; one of the aquariums has sand on its floor and the other gravel. The gravel serves to stabilise the apparatus, while the sand cleans the water. The article includes a drawing of the apparatus and an explanation of how it functions. The lower siphon which connects both vessels is double and thus prevents a dead centre from developing in the course of the functioning of the model.

10.71 Films (school films, popular science films, film cassettes, etc.)

309. ALTMANN, A.: Film v novém modelu výuky zoologie na základní škole (Films in the new model of zoology instruction in basic school)
Přírodní vědy ve škole, 32, 1980/1981, No. 3, pp. 88-89.

The methodological handbook for zoology teaching in basic school places increased stress on teaching media. It quite correctly recommends above all the use of original objects. The didactics of biology besides this also stresses the importance of combining original objects with suitably chosen substitutes for original objects, which if possible should be of a dynamic nature - such as films. In zoology teaching according to the new model in basic schools, very good use can be made especially of cassette films of 8 mm width, which have a number of didactical advantages, since they take into account modern principles according to which notions are formed and make it possible to form logical links to other teaching media. They also have advantages of a technical nature, such as the fact that a cassette projector is easily operated, is easily moved and provides an opportunity for founding a school cassette library. But of course a cassette film cannot serve as a substitute for observations and experiments done by teachers or by pupils. Cassette films should serve especially to demonstrate complicated and time--consuming experiments, etc.

310. CICHY, D.: Wpływ filmu przyrodniczego i programów telewizyjnych na efektywność nauczania biologii (The influence of nature study films and television programs of the effectiveness of biology instruction)
Biologia w szkole, 34, 1981, No. 2, pp. 83-85.

Biology teaching makes use of the life experiences which pupils have, which they gained during stays outdoors and by observing various natural objects and phenomena. Some teachers, besides making use of original objects, also make use of slides and especially films, which have the ability to show pupils things which are very difficult to see in nature or which remain hidden to the naked eye. The Polish specialist in the didactics of biology, W. Karpowicz, places films in second place, immediately after original objects, as far as their didactical effect is concerned. It is important to follow TV school programs, which have not only an informational function but also a teaching and educational one. They broaden a pupil´s horizon and extend the knowledge learnt in school. In this way they increase the effectiveness of biology instruction. This was confirmed by a research project undertaken in 1979/1980 with the students of the 4th year course at the Pedagogical School in Kielce. The aim of the project was to verify the hypothesis that school TV programs increase the effectiveness of biology instruction in the 7th and 8th classes of basic school. Tests to verify this hypothesis were given at 6 schools, where the experimental group was formed by 765 pupils and the control group by 127 pupils from the 7th and 8th classes of basic school. The findings indicate that TV programs increase the effectiveness of instruction from 12 to 17.5 % and films from 4.8 to 9.1 %.

311. DAUMER, K.: *Grundlegende Entdeckungen des Nobelpreisträgers Karl von Fritsch; Zwei Filmdokumente für den Biologieunterricht* (Basic discoveries made by Nobel Prize winner Karl von Fritsch. Two film documents for biology instruction)
Praxis der Naturwissenschaften - Biologie, 30, 1981, no. 12 pp. 370-380, 3 drarts for transparencies, 1 fig.

Two new films have been made for secondary school pupils, which take 14 minutes each. They both deal with the work of the ethologist Karl von Fritsch and his six basic discoveries: proof of the colour vision of bees, proof of their olifactory sense, proof of hearing in fish, his discovery of a special fright substance found in the skin of fish, his discovery of the significance of bee "dancing" and his discovery of animal orientation on the basis of polarised light. The article also contains suggestions for the didactical utilization of these films in biology instruction in secondary school. The content of the films is described in detail.

312. MÜLLER, G.J.: Naturfilme im Biologieunterricht (Nature films in biology teaching). Bedeutung und Analyse eines Beispiels. (Significance and analysis on the basis of an example)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 9, pp. 277-284. 3 tabs., 3 surveys.

Nature films used in biology instruction should not preclude the use of original objects. But films are of special significance in teaching about exotic flora and fauna, where original objects are usually lacking. The author demonstrates the opportunities for using films and discusses their didactical importance on the basis of the example of a film on how ants cut up leaves. The author analyses the film and shows how to use it. The name of the film in question is "Um Jahrmillionen voraus", and has been produced by BASF - Ludwigshafen in 1975. In 1976 the film recieved a prise. It deals with the social life of an ant community, the polymorphism of ants, their caste dimorphism, their eco-symbiosis and the significance of the biological protection of the life of their organism.

313. SLÁDEK, E.: Úloha zvuku ve školním filmu (The role of sound in school films)
Učební pomůcky ve škole a osvětě, 20, 1980/1981, No. 5, p. 75.

Sound films serve as a substitute not only for pictures but also for the spoken word. They thus represent a form of audio-visual communication, where the combination of image and sound are highly comprehensible, maintain pupils´ attention and are ostensive. There are three methods of using sound in school films: as the spoken word, as music and as authentic actual sounds. The dominating component of sound films for school use is the spoken word, i.e. commentary, while music has usually an emotional role to play. Authentic sounds serve to document the environment which the film concerns. In comparison to silent films, a sound film is more economical, has a richer spectrum of expression and is much better suited for various purposes (it is more versatile). The author also discusses the requirements made upon a good commentary to a school film, the relation between the spoken word and music and images, etc.

10.72 Television and radio in school

314. HARTMANN, U.: Erfahrungen und Vorschläge zum Einsatz von unterrichtsergänzenden Schulfunksendungen (Experiences and suggestions for the utilization of school radio programs in instruction)
Biologie in der Schule, 30, 1981, No. 10, pp. 435-441.

Radio broadcasts have been broadly developed for use in various grades and they can be used for various purposes. The aim of this article is to acquaint readers with existing experience in this area. The author first discusses the history of school radio broadcasting and then provides a survey of the available programs, their name and relation to the teaching syllabi used in various grades, as well as bibliographical annotations found in the journal Biologie in der Schule concerning radio broadcasts.

315. HARTMANN, U.: Schulfernsehen und Schulfunk im Schuljahr 1981/1982 (School television and school radio programs in the academic year 1981/1982)
Biologie in der Schule, 30, 1981, No. 7/8, s. 337-341.
3 tabs.

School television programs in the new school year will for the first time include programs for instruction in the 5th class. This survey cites the name of the program, the date of its broadcast and length of program for the 5th, 9th and 10th classes. The same data are cited for radio programs, which will be broadcast in four series and concern various topics (for instance The Life and Work of Outstanding Biologists, etc.)

316. KEMPE, R.: Vorschläge für methodische Möglichkeiten beim Einsatz der Fernsehsendungen Biologie Klassen 9 und 10. (A survey of methodological opportunities provided by television broadcasts for biology instruction in the 9th and 10th classes)
Biologie in der Schule, 30, 1981, No. 10, pp. 442-445.
1 fig.

The author discusses various methods, such as the formulation of assignments, giving pupils worksheets, problem questions, the use of transparencies, etc. which are used in connection with the watching of television programs with the objective of achieving better attention, the taking of notes and active participation. The author first enumerates the advantages of television, such as motivation of pupils, the possibility of showing sub-microscopical processes, etc. and the organizational prerequisites needed for its full utilization. The author also analyses, as a specific example, those teaching topics concerning genetics which can best be studied with the aid of TV programs - specifically a 7 lesson unit, which is described briefly. Similarly, another 8 lesson unit for the 9th class is also analysed.

317. LIES, E.: Erfahrungen beim Einsatz der Unterrichtssendung des Bildungsfernsehens "Sind Pflanzen reizbar ?" (Experiences with the utilization of school television programs on the subject "Are plants sensitive ?")
Biologie in der Schule, 30, 1981, No. 1, pp. 31-32.
1 fig.

The author describes the use she makes of television programs for repetition and the systematisation of the subject-matter taught. A TV broadcast is usually supplemented with worksheets. After the program is finished the pupils have a specific amount of time available to fill in the worksheet, which is then corrected in class and homework assignments are given.

318. LIES, E.: Erfahrungen beim Einsatz der Unterrichtssendung des Bildungsfernsehens "Zeugnisse der Menschnewerdung" (Experiences with the utilization of school television programs on the subject "The Testimony of Anthropogeny")
Biologie in der Schule, 30, 1981, No. 2/3, pp. 88-90, 1 fig.

This TV program can be made use of in five teaching units. It assumes preliminary knowledge on the part of pupils, and use can be made of worksheets, which also serve to make the subject-matter more systematic. It is best to make use of the program in the course of four teaching lessons, which the author describes in detail. She cites in full a worksheet dealing with the outline of phylogeny of man and suggests suitable teaching media for the first three teaching lessons.

319. TARWID, K.: Pocsczólka Maja nauczycielka biologii w naszym kraju. (Maja the Bee as a biology teacher in our region)
Biologia w szkole, 34, 1981, No. 3, pp. 155-156. 1 photo.

Maja the Bee from the Polish television series has become very popular. However, zoologists have some negative comments to make concerning these programs, since the way of life of the Honey bee is here described in a very imaginative manner, but not quite correctly. There are many anthropomorphisms and anachronisms in the program. It would be much better to have such popular television serials in harmony with the findings of modern science.

320. ZDEBSKA-SIEROSŁAWSKA, J.: Polskie radio proponuje (What Polish Radio is preparing)
Biologia w szkole, 34, 1981, No. 4, pp. 254-255.

The Central Section for Educational and Popular Science programs of Polish Radio has prepared a number of programs concerning biology for pupils in basic and secondary schools, which are closely linked to the subject-matter being taught in school. The author cites programs and describes their use in classroom work.

10.73 Pictures

321. DUDOVÁ, E.: Školní obraz a jeho formát (School pictures and their format)
Učební pomůcky ve škole a osvětě, 20, 1980/1981, No. 3, pp. 40-43. 7 figs.

Pictures are still among the most useful and most frequently used teaching aids in all types of schools. They are popular not only with teachers, but also with pupils, especially of in the lower classes basic school. The Czechoslovak enterprise Komenium produces various pictures and recently has published various pictures for use in the elementary classes of basic school. The manner of use of these pictures is determined by their format. They serve mostly for demonstrations, they are comprehensible and can be examined from a distance in the classroom. Komenium produces pictures size A0, A1, A2, A3, A4 and A5.

Pictures concerning the natural sciences which show a natural object as a whole and in various details, are usually size A1. These include for instance sets of pictures of deciduous tress, conifers and fruit trees, sets of pictures concerning man, the structure of his body and the structure of a plant. The most recent two sets of pictures can be used as magnetic board appliqués. They are size A3 and include pictures of natural objects such as flowers of the forests, meadows and fields, agricultural plants, vegetables, invertebrates, fish, amphibians, reptiles, birds, mammals, butterflies, etc. Pictures size A4 and A5 provide opportunities for the independent work of pupils, for instance with a Plant Atlas, Fruit Atlas and Animal Atlas, where individual pictures are not bound together, but are loosely packed in a special cover. The article also deals with the problem of framing or otherwise mounting the pictures and their storage.

322. CHALAŠOVÁ, J.: Učební pomůcky pro přírodopis v 6. ročníku základní školy (Teaching aids for nature studies in the 6th class of basic school) Učební pomůcky ve škole a osvětě, 20, 1980/1981, No. 8, p. 128 and cover. 6 figs.

The new concept of teaching the natural sciences and especially zoology in the 6th class of basic school has produced a number of teaching aids made by the enterprise Komenium, which has offered ahead of time wall pictures of for instance the worm Dendrocelum lacteum, the polyp Hydra grisea, the spider Aranea diadematura, a snail, earthworm, a picture of the external structure of the crayfish (2 pictures) and of the honey bee. Also a set of appliqués for a magnetic board for use in the 5th class of basic school makes it possible to give pupils independent assignements, such as bringing together the components of a plant cell and an animal cell in the 6th class; in higher classes also bacterial cells are assembled. This whole set of appliqués is called The Cell. Appliqués for studies concerning the anatomy of the carp fish, frog, grass snake, pigeon and cat are also available. An appliqué set for the Domestic rabbit is being prepared. Of the new 16 mm films available, The Animal Ancestors of Man is a biology topic, as well as the series Palaeontology I and Palaeontology II, based on originals by Z. Burián. For environmental and nature conservation education there is a slide series calles Protected Species of Animals. A cassette film called Care of the Young and a 16 mm film called A Bird Family can be used for education towards parenthood and sexual education. A panel concerning the phylogeny of the Chordata, together with 4 wall pictures size 70 x 100 cm and 54 pictures of contemporary and extinct animals serve for teaching about the historical development of animals. The panel makes it possible to give pupils independent assignments during the whole zoology course and is intended for specialized biology classrooms. A film concerning basic behaviour of animal, as well as a film about grass snakes (16 mm) and films called Important Animals of Various Continents and The Flora and Fauna of the African Savannah all serve ethology teaching.

323. Od molekuly k buňce (From the molecule to the cell)
Učební pomůcky ve škole a osvětě, 20, 1980/1981, No. 1, back cover. 3 figs.

A set of pictures called "From the molecule to the cell" describes the findings of biological research done with an electronic microscope. A team of authors (K. Beneš from the Czechoslovak Academy of Sciences and D. Kvasnička from the Pedagogical Research Institute in Prague, together with the graphic artist P. Vanke and cameraman J. Hanus from the Barrandov Film Studio) have produced 3 picture tables, which describe the present state of knowledge concerning the structure of the cell. The accompanying text makes it possible to achieve an understanding of the importance of an electronic microscope for the study of submicroscopic structures of the cell and of the progress biology has made in this field. The pictures can be used in all types of general education schools.

324. RICKERS, K.S.: Modifying Instructional Materials for Use with Visually Impaired Students
The American Biology Teacher, 43, 1981, No. 9, pp. 490--492 and 501. 4 figs.

The author, who is a specialist in the education of children with impaired eyesight, provides various suggestions for making certain sections of pictures of animals, which often tend to merge together for those with poor eyesight, more colourful, so that they can be distinguished better. This concerns especially pictures of insects and their very fine organs (for instance wings, legs, etc.), as well as organs which make it possible to distinguish sex (here specific colour symbols might be used). The author also suggests the use of a model of mitosis, which is three-dimensional. The article contains various instruction for biology teachers who teach those with weak eyesight, with the aim of facilitating a view of nature for their students.

325. Zemědělské rostliny (Agricultural plants)
Učební pomůcky ve škole a osvětě, 20, 1980/1981, No. 1, pp. 15-16 and back cover. 6 figs.

Sets of pictures for use in the teaching of the natural sciences in the elementary classes of basic school, which include 12 tables size A3 are called: Man and his environment, Plants and the variability of living nature. The set called Plant is divided according to their economic importance into cereals, potatoes and sugar beet, legumes, oil producing crops, forage crops and industrial plants. The set of pictures also includes a commentary for teachers, where each group of plants is described and information on the origins of the plant, the demands it makes upon the soil, climate and how it is utilized is given. The pictures include barley, oats, peas, lentils and sunflowers.

10.732 Pictures attached to magnetic boards

326. ARGALÁČ, M.: Aplikácie pre magneticku tabulu
(Appliqués for a magnetic board)
Učební pomůcky ve škole a osvětě, 20, 1980-1981, No. 8, p. 122.

The teachers of the basic school in the town of Poprad (at Komenský street) discussed the problem of making teaching aids and instructional material for the 5th class of basic school and decided to contribute to their making. Among those they made are appliqués to be used with a magnetic board. The author describes how sets called The cell and Photosynthesis were made. Their impact on instruction was assessed in a very positive manner; not only did they improve pupil motivation, but they also made various biological notions easier to understand and improved the effect of repetitions.

327. CHALAŠOVÁ, J.: Aplikace na magnetickou tabuli a nástěnné obrazy pro přírodopis v 5 ročníku ZŠ
(Appliqués for a magnetic board and wall pictures for nature science instruction in the 5th class of basic school)
Přírodní vědy ve škole, 32, 1980/1981, No. 10, p. 371.

The author points to the possibilities which the use of magnetic boards provides. Various sets of appliqués have been provided by the Komenium enterprise for biology instruction. There is a set called The structure of the plant, which shows a tomato plant, as well as The structure of the cell and Plant nutrition. Also a wall picture of the mushroom Agaricus arvensis is available. These aids can be used in various stages of instruction.

10.733 Foils and transparencies

328. HUNNESHAGEN, H.: Proteinsynthese - einmal anders (The synthesis of proteins - this time differently) Biologie in der Schule, 30, 1981, No. 7/8, pp. 335-336. 1 fig.

Psychologists have found that a good mood and a feeling of success have a positive effect on the functioning of synapses and maintaining contacts between brain cells. For this reason information connected with positive emotions can be more easily maintained in the memory and processed. On this basis the author designed a transparency which deals with "enjoyable proteosynthesis" where she uses comical elements. She describes the method and its implementation in detail.

329. SCHREGER, H. - KLEPEL, G.: Ein Foliensatz zur Behandlung der "Photosynthese" in Klasse 9 (A set of transparencies for teaching photosynthesis in the 9th grade).
Biologie in der Schule, 30, 1981, No. 12, pp. 516-518. 1 fig.

The subject-matter of photosynthesis is the central theme of biology instruction in the 9th class. However, learning this topic is connected with a number of problems. It should be taken into account that this is a very complex process and that teaching it requires its simplification. In order to overcome these problems, the author has designed 6 transparencies, which he describes in detail. Their important aspect is the fact that they attempt to simplify the whole process into its essence.

330. WOLSCH, J.: Infektionskrankheiten - Immunisierung. Hinweise zum Einsatz eines Arbeitstransparentes
(Infectious disease and immunisation. Instructions for the use of a transparency)
Naturwissenschaften im Unterricht, 29, 1981, No. 1, pp. 5-9. 11 figs., 3 transparencies.

The author suggests using 3 transparencies in the teaching of the topic on infectious disease and immunisation. The transparencies serve to form new concepts (immunisation, antigens, antibodies, active immunisation, passive immunisation). This subject-matter is suitable for the upper classes of various types of secondary schools.

10.74 Photographs, macro-photographs, micro-photographs

331. KONĚTOPSKÁ, A.: Makrofotografie a mikrofotografie v praktických cvičeních z biologie na gymnáziu
(Macro-photographs and micro-photographs in practical biology excercises in general education secondary schools)
Přírodní vědy ve škole, 32, 1980/1981, No. 2, pp. 48-51. 1 fig.

Adequate documentation of observed material is an important part of all biological research. In the majority of cases the shape of the object under observation must be drawn. Besides this classical method, at present also photographs are being increasingly made use of. Secondary schools have the possibility of acquainting pupils with photographic methods within the framework of biology practical excercises. The author divides the subject-matter into two two-hour teaching periods. During the first the teory of macro- and micro-photographs is dealt with, with stress on the practical arrangement of the apparatus used. The second period should serve for the training of skills needed for micro-photographs, which are much more difficult. In specific instructions the author recommends various objects for photographing, as well as the material needed and how to proceed.

332. THEUERKAUF, H.: Oberflächenvergrösserung bei Tieren im Mikrofoto-Erläuterungen zur Bildbeilage
(Enlargements of the surface of animals in micro-photographs - explanations concerning a picture appendix)
Biologie in der Schule, 30, 1981, No. 4, p. 152, appendix with 15 photographs.

The first table in the pictatorial appendix shows the magnification of the surface of the muscous membrane in the intenstines, while the second and third deal with the internal structure of excretion organs, the fourth and fifth with the internal structure of respiratory organs, the sixth with organs which recieve excitation impulses and language, while the eighth concerns nerve tissue.

10.75 Slides and slide series

332. BUSCHENDORF, J.: Objektdias im Biologieunterricht
(Slides in biology instruction)
Biologie in der Schule, 30, 1981, No. 6, pp. 237-239.

In spite of the fact that teachers have at their disposal a number of commercially made teaching aids, there is still the possibility of making them. The author, on the basis of his own experience, describes various opportunities for making slides, where a natural object is placed between two glasses and projected instead of a film. First various technical instructions and advice are given, as well as a survey of suitable objects which can be mounted in this way for teaching in the 5th to 9th classes, including for instance scales, fins and gills of fish, the skin of a reptile, the feathers of birds, and the hair of mammals, as well as small plants, leaves, parts of flowers, planaria, earthworms, the wings of insects, algae and Bryophyta, etc.

333. PECHANCOVÁ, M.: Využití diapozitivů v hodinách botaniky na gymnáziu (The use of slides in botany instruction in general education secondary schools)
Přírodní vědy ve škole, 32, 1980/1981, No. 3, pp. 91-92.

When teaching subject-matter on the structure and function of plants, slides can be used very successfully and usually schools own both projectors and slides. The author, in an attempt to overcome stereotypes in the presentation of the subject-matter taught, has prepared three sets of slides to which she has added instructions for carrying on a problem dialog between teacher and pupil.

334. ROZENSHTEYN, A.N.: Diapozitivi i diafilmi k kursu biologii (Slides and slide series in the biology course)
Biologiya v shkole, 55, 1981, No. 5, pp. 39-42.

The author describes the following slide series suitable for biology teaching, which are available for Soviet schools: Roots, Seasonal phenomena in the life of plants, Plant communities, Unusual plants, Predator plants, Predator beetles and ants, The phylogeny of birds, Insectivorous animals, Artiodactyls and peressodactyls, The fur industry, The structure and work of the heart, The structure and work of the respiratory organs, The structure and function of the brain, The regulation of respiratory movements and artificial respiration, The life of Charles Darwin, Natural selection, Air and water conservation, Also detailed comments are provided for the slide series Micro-objects for botany, for use in the 5th and 6th classes, Medicinal herbs, The order Proboscidae, Biogenetic laws and The biosphere and man.

10.76 Sketches, floral diagrams and formula

335. HIRSCHMANN, W.: "Borkenkäfer-Uhr" und "Elefanten-Uhr" (A lesson on the bark beetle Ips typographus and a lesson on the elephant)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 4, pp. 110-112. 2 drawings.

The author first describes the monographical presentation of an insect pest, the bark beetle Ips typographus and then problems connected with the Indian elephant, especially from an ecological point of view. The foundation of both lessons, as far as the work of both the beacher and the pupils are concerned, are cyclical drawings in which the development of the bark beetle is shown in one and a comparison between the African and Indian elephants is provided in the second. Cyclical drawings are also the basis for discussions with pupils for learning the most important facts concerning both topics. The drawings can be done on the blackboard, as well as in pupils' notebooks or also on transparent foils for projection with an overhead projector. The pupils themselves write the text for the pictures.

336. LYSEK, G.: Drawing Techniques in Biology - Outline of a Postgraduate University Course
Journal of Biological Education, 15, 1981, No. 3, pp. 209-212. 2 figs.

A somewhat decreased interest in systematics and hence drawing in botany and zoology have led to the need to introduce a course in practical drawing, which is still an integrating factor in modern biology. No biology teacher can do without drawing skills and also pupils should be taught how to draw. The skills needed to draw a specific part of a biological object are often more needed then photographs or slides, because a drawing makes it possible to show various details which photographs do not. The author submits a program for teaching drawing skills in the context of biology.

337. SPRAY, M.: Making the Past Serve the Present
Journal of Biological Education, 15, 1981, No. 1, pp. 51-56. 1 fig.

The Department of Garden Architecture at the College of Arts and Design in Gloucestershire uses very interesting methods of botany and dendrology instruction. Texts written by botanists and dendrologists from the 18th century are confronted with the latest scientific findings. As an example the author cited the use of a description and drawing of a tree with its roots; on the left side are annotations concerning various functions of its components (leaves, branches, the trunk, roots, etc.) as described in the 18th century and on the right side the students write the findings of their own observations and study. The students then correct the findings of the 200 year old descriptions and thus learn to critically study texts, as well as natural objects.

10.79 Rubber stamps, prints, photograms

338. BRETSCHNEIDER, J.: Nutzung der Stempel zum Stoff- und Energiewechsel der Pflanzen (The use of rubber stamps in teaching plant metabolism)
Biologie in der Schule, 30, 1981, No. 5, pp. 206-209.
5 figs.

The author considers the use of rubber stamps for the teaching of the topics "Photosynthesis" and "Respiration". Certain problems have appeared with their use where the rubber stamps shows the formation and further reactions of OH radicals. But in the chemistry course, dissociation of water is not mentioned, so that in biology the teacher cannot assume a knowledge of this problem. For this reason the author makes three different suggestions for adaptations of the rubber stamp. The rubber stamp for respiration does not present such difficulties and it is sufficient only to somewhat extend it.

339. GRABY, R.: Nutzung der Stempel zum Stoff- und Energiewechsel der Pflanzen - ein Diskussionsbeitrag (The use of rubber stamps in teaching plant metabolism - a contribution to the discussion)
Biologie in der Schule, 30, 1981, No. 12, pp. 519-520. 2 figs.

The author expresses dissenting opinions concerning the rubber stamps for use in class work on the topics "Photosynthesis" and "Respiration", which were published in this journal (30, 1981, No. 5). The author recommends the introduction of some changes in the rubber stamps.

10.83 Textbooks and methodological handbooks

340. ANGELOVA, R.: Novoto uchebno sdrzhanie po biologiya v 9 klas (The new teaching syllabus for biology in the 9th class)
Biologiya i khimiya, 24, 1981, No. 5, pp. 62-63.

In the school year 1981-82 a new biology textbook for the 9th class will be published.The content of the textbook represents the new concept of teaching biology. The textbook has two sections: The theory of evolution and The foundations of ecology and environmental conservation.

In the first section, pupils become acquainted with Darwin´s theory, as well as with contemporary evolutionary theory. The knowledge gained in the 8th class in genetics is made use of and the foundations of biology-genetics and ontogeny are taught.

In the second section, the knowledge learnt in the 7th class is further developed, concerning the relation between the organism and the environment and their unity and mutual dependence. To this are added the topics on matter and energy flows. Questions have been developed for both sections of the textbook, as well as assignments for pupils´independent work and homework.

341. FARAGÓ, L. - BALÁZS , J. - RADVÁNYI, G.:
A kisérleti tanykönyvek kipróbálásáról (On the verification of experimental textbooks)
A biológia tanítása, 20, 1981, No. 1, pp. 3-7.

The three authors are teachers at general education secondary schools here acquaint the reader with their own experiences in using the 4th version of the new biology textbook. Professor Faragó teaches in a class of 28 pupils whose knowledge might be described as average. Their diligence and work morale were unsteady, and occasionally even poor. This situation was made worse when the pupils found out that they were participating in experimental instruction and that thus they could not fail. The new subject-matter was to have been taught in a course of 3[illegible] lessons, but the problem was that some specific teaching lessons proved to be too short (45 minutes) for the particular topic. 14 lessons were devoted to tests. Under normal conditions the new subject-matter would have been dealt with during 2 teaching lessons weekly. Generally it is possible to conclude that the ordering of the subject-matter in the new textbook is much better than in the old one. With the help of the Hardy-Weinberg law it is possible to show precisely an ideal state of equilibrium in a natural population. The subject-matter concerning ecological systems should be presented in a more concise manner. The pictatorial material is considered to be of good quality and useful. Definitions are clear and unequivocal. The chapter on the relationship between man and the natural environment was found to have a very good impact on pupils. On the basis of the experiences of prof. Balász , the subject-matter of this topic was unusual for pupils, but after several lessons, when they became better aquainted with all the important connotations of the subject-matter, they began to consider it interesting. The pupils also showed an interest in genetics. Prof. Balász has certain doubts about the usefulness of teaching the Hardy-Weinberg law and asks whether it is really useful to go into such detail and to calculate percentages on the basis of mathematical equations. She considers it especially important that the material is ordered in such a way that pupils gain correct evolutionary concepts, beginning with the structure of a molecule up to ecological systems. Professor Radvanyi essentially agrees with the other two authors, but especially stresses the fact that the new textbook is the outcome of the latest biological research, which defines the role of man in the biosphere and this in turn makes it possible for the pupils to become aware of the importance of having and maintaining equilibrium in the biosphere and forming a harmonious environment.

342. GEMEINHARDT, D.: Unser Beitrag zum X. Parteitag der SED Unterrichtsdiskussion "Zum aktuellen Thema" - eine Zwischenbilanz (Our contribution to the Xth Congress of the Socialist Unity Party of Germany with the discussion "Concerning a current problem" - an assessment)
Biologie in der Schule, 30, 1980, No. 5, pp. 209-210.

Discussions on the preparations of a new textbook and methodological handbook for the 8th class have encountered a lively reaction among teachers. They deserve to be thanked for this. The discussion has shown that from a conceptual point of view all materials have been carefully prepared. Critical comments concerned the role of motivation and the activation of pupils and the utilization of assignments for political and health-care education. Greater use should be made of life experiences and also the comprehensibility and ostensive nature of the textbook should be improved.

343. HAGEMANN, J.: Zum aktuellen Thema (Concerning a current problem)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 98-99.

The author here expresses her opinions on the new biology textbook and methodological handbook for the 8th class. She concentrates on inprecise formulations and some obscure points found in the survey of the textbook which was published in this journal (1980, No. 7/8). For instance she recommends including some mention of the fact that rudiments of thinking can be found in animals. She also suggests replacing the term productive labour with the term "planned and creative labour".

344. HORVÁTH , E.: Gondolatok a szakközépiskolai biológiaoktatásról (Comments on biology instruction in vocational secondary schools)
A biológia tanítasa, 20, 1981, No. 3, pp. 74-76.

A study which attempts to answer the question of whether pupils in various specializations can use a common textbook. The author, who is on the staff of the State Pedagogical Institute, is of the opinion that existing studies indicate that no single answer has yet been provided. The integration of the teaching syllabus represents great progress in biology teaching, but the integration of specialized subjects has not yet taken place, including those which are based on biology. For this reason various suggestions are made to solve this problem. Changes are suggested as far as the sequence of subjects is concerned. The need for several lessons concerning various forms of living substance to be placed at the beginning of the chapter on evolution and the biosphere is stressed, since this part of the syllabus contains difficult abstract terms which make learning difficult. Another suggestion concerns the need to devote more time to problems of the environment; the reasons for this do not require justification.

345. LANGE, S.: Bodenreaktion - ein Umweltfaktor der Pflanzen (Soil reactions - one of the factors in a plant environment)
Biologie in der Schule, 30, 1981, No. 6, pp. 236.

In an article published in this journal a year ago the author stressed the need to study Ph values in the soil. A new methodological handbook for biology instruction in the 9th class now covers this problem very well. It should also be included in the textbook.

346. RUNST, H.: Zum aktuellen Thema (Concerning a current problem)
Biologie in der Schule, 30, 1981, No. 4, pp. 160-161.

The author here expresses his opinions concerning the new textbook and methodological handbook for the 8th class. In his opinion the textbook should be more a workbook and the text more comprehensible and attractive. From these points of view the author then criticises some of the drawbacks of the new textbook and makes suggestions for improvements.

347. SZYLARSKA, E. - SZYMANDERSKA, W.: Badania wdrźeniowe podręcznika eksperymentalnego biologii dla klasy V.
(A study of the introduction of an experimental biology textbook in the 5th class)
Biologia w szkole, 34, 1981, No. 4, pp. 225-230.

The authors cite the findings of a study aimed at assessing the use of an experimental textbook in the 5th class. The study confirmed that the textbook fulfills the demands made by the teaching syllabus for the modernization of biology instruction in basic schools in Poland. The theoretical part of the study analyses the content of individual teaching lessons, compares them to the demands made by the curriculum as a whole and the biology teaching syllabus specifically and analyses logical relations between various parts of the textbook. The study also contains an empirical analysis of the work of teachers and pupils with the new textbook, in which their opinions were sought and they were asked which media they used to teach according to the new textbook. The findings of the study are described in detail.

10.85 Worksheets, workbooks, didactical tests, questionnairs, didactical cross-word puzzles, didactical games, etc.

348. BAYANKINA, Z.V.: *Vospitaniye u uchashchikhsya tovarishcheskikh otnosheniy v process obucheniya biologii* (Education towards comradely relations among pupils in the course of biology teaching)
Biologiya v shkole, 55, 1981, No. 1, pp. 40-44.

The forming of comradely relations among pupils in the class can be done on the basis of effective educational means, such as for instance:

1. Games and excercises - for instance in the course of reenforcing what has been learnt in systematics, pupils look for those plants or animals which do not belong to a specific group. Also cross-words or various puzzles can be used.
2. Games and puzzles - for instance groups of pupils compete in looking for incorrect statements in texts.
3. Games with a specific subject-matter, where various roles are played by individuals, such as for instance a researcher and various animals which must be discovered.
4. Playing at "travelling" to a specific geographic area where flora and fauna are described or travelling into the past.

In all these activities comradely relations are developed and a key role is played by the teacher, whose personality determines the positive emotional impact made.

349. CICHY, D. - SZYLARSKA, E.: Test osiagnieć szkolnych z biologii w klasie V. (A test to determine school performance in biology in the 5th class)
Biologia w szkole, 34, 1981, No. 4, pp. 206-210. 12 figs.

The authors have designed worksheets with tests concerning the first two groups of topics taught in the biology course in the fifth class. The test is a multiple-choice one and includes 20 questions. Each test has two versions.

350. DUSSART, G.B.J.: A Teaching Game for Applied Hydrobiology
Journal of Biological Education, 15, 1981, No. 2, pp. 123-136, 9 figs., 10 tabs.

The game described is based on a specific section of a river where the students, led by their teacher, study the causes of various negative phenomena, such as the death of fish, the incidence of parasitic water fungi from sewerage, etc. The teacher draws a map of the river section in question, has it copied and then groups of students draw various further information into the map. This information can include the location of tributaries of the river, the geology in the vicinity of the river, the town and its industry, the inflow of sewerage, etc. The students then study the micro-organisms found in the water, draw up tables of microorganisms, as well as tables of insects found in the water and on the banks. The author describes a number of other details concerning this interesting game, which helps students to understand the problems of hydrobiology and environmental conservation. The game is intended for pupils of the upper classes of secondary school.

351. FEDOREC, G.F.: Didakticheskaya igra v processe izucheniya biologii (Didactical games in the course of biology study)
Biologiya v shkole, 55, 1981, No. 3, pp. 31-35.

Didactical games are one of the best means of improving the dynamics of the teaching process and improving the activity and independence of pupils. Several kinds of didactical games exist: 1. Games which serve as excercises (for instance cross-word puzzles, riddles, zoological lotto, etc.)
2. Playing at travelling (for instance expeditions to look for fruits and seeds, etc.).
3. Subject-matter games (pupils make belive in specific roles and play out specific situations).
4. Games as competitions between various groups in the class. The author also cites specific examples of these games, which help to develop comradely relations among pupils. (cf. Biologiya v shkole, 55, 1981, No. 1, pp. 40-44).

352. GRAHAM, W.S.: The spider's web
The School Science Review, 62, 1981, No. 221, pp.700-704.
1 fig., 1 tab., lit. 8.

A spider web can serve as a didactical and educational game. This is a biological game, which serves to reenforce knowledge of various types of insects. A "web" has various fields with different specie of insects (in some there are two representatives). Along the left and right side of the web are larger fields where typewritten questions for the students are placed. A player rolls dice and moves his playing token the number of fields determined by the dice. When he arrives at a field with a specific insect, he must answer a question. If he answers correctly he recieves a card, when he fails to answer correctly he must return one of the cards he has. When he lands in a field with two insect species, he must answer two questions. The game continues along the web in a spiral. The player who first arrives at a field with a spider in it wins.

353. STAWIŃSKI, W. - ZĘBALSKA, E. - DLUGOWIEJSKA, J.: Test osiagnięć szkolnych z biologii w klasie V.
(A test to determine school performance in biology in the 5th class)

The authors have designed a test for use in the second term of the 5th class. The test has two versions and is multiple-choice. Each test contains 20 questions. These tests concern the topics The variability of invertebrates and Environmental conservation.

10.86 Atlases and Keys to natural objects

354. AUXERRÉ, P.: Les faluns du miocéne en Touraine et en Blésois - vers un approche du paléoenvironment sédimentaire (Miocene shell-marls in Tourain and Blésois - methods for approaching a sedimentary paleo-environment)
Biologie, Géologie, 68, 1981, No. 1, pp. 1-78. 1 fig.

The region of Touraine, southwest of Paris, is rich in soils which contain the remnants of prehistoric mollusc shells which are an important component of so-called shell-marls, used also as crop fertilizers. On the basis of samples of the marls, the author has drawn up a key to the paleo-zoological material found in this area and provides detailed descriptions of it in the form of tables and an alphabetical index. The introduction describes the method of work used and how the key should be used.

355. HOUFEK, J. - STŘIHAVKOVÁ, H.: Určování rostlin ve 4. a 5. laboratorní práci v 5. ročníku základní školy (The identification of plants in the 4th and 5th laboratory assignments in the 5th class of basic school)
Přírodní vědy ve škole, 32, 1980/81, No. 7, pp. 244-246.

The educational and teaching objective of both cited laboratory assignments is to teach pupils to use an identification aid, in this case Faustus, L. - Polívka, F.: Botanický klíč (A Botanical Key). The article cites various plants suitable for this type of laboratory work. Their range is limited by what is found in the Key. During the first laboratory assignments plants which have large flowers should be used and which have a single or simple inflorescence; regularly shaped flowers are better since then it is easier to distinguish the sepals and petals of the floral envelope. In the second laboratory assignment plants which are smaller flowers can be chosen and which have a larger number of them. A basic rule in chosing plants for laboratory work where they are identified is that these plants should be easy to acquire and should be available in large numbers.

356. KÖNIG, H.: Zeichnung und Bestimmung einheimischer Süsswasserfische in der 6. Klasse (The drawing and identification of domestic fresh water fish in the 6th class)
Naturwissenschaft im Unterricht - Biologie, 29, 1981, No. 8, pp. 253-258. 1 fig., 2 tabs.

Domestic fresh water fish are not in the pupils´ focus of interest. They are usually much more interested in exotic fish found in aquariums. In the 6th class of a general education secondary school in Oppenheim (Rhineland) a class concentrates on a study of domestic fresh water fish, their collection (in cooperation with fisheries), their drawing, with stress on various diacritical signs and their identification according to a Key, which the pupils themselves made with the help of their teacher. These fish served very well for school studies for several reasons: they very well illustrate various aspects of ethology, physiology, ecology, morphology and anatomy, they are good indicators of water pollution, they are an important food component and they are suitable objects for leisure--time activities (fishing, aquariums). During class work the pupils drew the fish´s habitus, learned to use the key they had made and about the life of fresh water fish. In drawing fish, the shape of the body is very important, as well as the number of fins and their position, the shape and position of the mouth, their lateral lines, their size, the shape and position of their scales, fin rays and colouring. The key has a total of 19 items per fish and deals with 17 different fish.

10.87 Basic scientific literature, literature concerning the didactics of biology

357. YAKHYAYEVA, M.I. - KADIROVA, R.N.: Opit ispolzovaniya metodologicheskogo zhurnala v podgotovke budushchikh uchiteley (Experiences with the use of a methodological journal in the training of future teachers)
Biologiya v shkole, 55, 1981, No. 1, p. 44.

At the Department of Biology Methodology at the Dushambe Pedagogical Institute a great deal of attention is devoted to the training of future teachers and their learning to use pedagogical and methodological literature, especially the journal Biologiya v shkole. From the 3rd year course onward, students become acquainted with the journal, they learn to make their own card files on its content, to make excerpts from the articles and thus to develop systematic work with the journal. Many students subscribe to the journal, so that by the time they graduate, they have a number of issues at their disposal. In the course of study they use the journal to prepare and plan the teaching of various topics. The articles help them to make their way in the teaching syllabi, in the new textbooks in use,to prepere lessons and practical excercises and also to be able to apply the documents of the Central Committee of the Communist Party of the Soviet Union and the Soviet government to the subject-matter of biology. The students and teachers of the Faculty would welcome more articles published in the regular columns "Aiding Young Teachers" and "New Items in Science".

10.88 Popular science literature and periodicals

358. BEREND, M.: A "biologia aktuális problémai". (On "Current biological problems")
A biologia tanítasa, 20, 1981, No. 5, pp. 159-161.

The name of the article indicates the name of a series of books of the same name, which have been published since 1974 by the Budapest publishers Medicina. Each year three volumes are published and each volume contains 3-5 different studies. This series is helpful not only to physicians, but as experience has indicated, also to professional biologists and those who work in various fields of biology, including teachers of biology in secondary schools; all these people find material for study in their continuing self-education in these volumes. The author assesses positively the variety of subject-matter included in the series and the attention which the series pays to the latest developments in biological theory.

359. NIKIFOROVA, I. - TSVETKOV, T.: Nova kniga za uchitelite po biologia (A new book for biology teachers)
Biologiya i khimiya, 24, 1981, No. 5, pp. 60-61.

A book by G. Nikolov, "William Harvey - the Discoverer of Blood Circulation" is devoted to the life and scientific work of one of the greatest persons in the history of medicine and the natural sciences. The contribution made by Harvey is described on the background of the political and social conditions existing at the end of the 16th century and beginning of the 17th century. The author aims at demonstrating that revolutionary ideas always encounter resistance and require not only great scientific erudition, but also a brave spirit on the part of those who discover them.

10.89 Pupils´ notes

360. SEHMRAU, W.: Zur Führung von Merk- und Übungsheften - ein Beitrag zur Diskussion (Concerning pupils´notebooks and workbooks - a contribution to the discussion)
Biologie in der Schule, 30, 1981, No. 9, pp. 387-390.

The author expresses the opinion that the subject-matter to be noted and learnt should be kept separate from that which is used for excercises. He also comments on the methods used for supervising pupils´ notebooks, where only problems denoted by the teaching syllabus as basic should be written. In the second part of the article the author discusses excercise workbooks, which are used for homework, for preparing reports and essays, the planning of observations and experiments, etc.

10.9 Instruments and devices for biology instruction

361. FIDO, H. - SIMMONDS, D.: A Survey Frame for Field Biology
The School Science Review, 62, 1981, No. 220, pp. 493--494. 2 figs., 2 lit.

The authors describe a special surveying frame for field work in biology. The apparatus needed for surveying is simple, inexpensive and can easily be assembled. It consists of a water level, a mirror and several simple accessories.

362. KAUFMANN, M.: Der Einsatz des Handmikrotoms im Biologieunterricht der gymnasialen Oberstufe (The use of a manual microtome in biology instruction in the upper classes of secondary school)
Der mathematische und Naturwissenschaftliche Unterricht, 34, 1981, No. 4, pp. 233-236. 3 figs., lit. 10.

The author describes the opportunities for using a manual microtome for making thin slices of biological material for use in microscopy. First he describes in detail the functioning of a microtome and on the basis of examples how it can be used in school. Besides the microtome, also a grinding agent is needed, a razor and some other accessories. This instrument is especially needed when dealing with the topics Cytology and also The metabolism of eutrophic organisms.

10.92 Instruments and aids for experiments with natural objects

363. KABACIK-WASYLIK, D.: Pułapki glebowe jedna z ekologisznych metod w entomologii (Soil traps - one of the ecological method used in entomology)
Biologia w szkole, 34, 1981, No. 3, pp. 157-160. 5 figs.

Soil traps for insects are sometimes also called Barber traps according to the zoologist who first used them in 1931. To make these traps we need a glass jar, a cylinder and a metal or plastic vessel. They are arranged and placed in the soil according to the objective of the experiment. Anthropoda moving along the surface of the soil can be captured or those that move in the upper layers of the soil. The author describes the traps and their arrangement for various purposes and discussed such variables as the depth of the hole in which they are placed, the size of their openning, etc. Inside the trap a net can be placed, which automatically divides the insects according to size. The traps are used either to catch living insects or they can be filled with liquids which immediately kill the specimens and preserve them. Traps designed to register the activity of insects can be equipped with a special time-keeping mechanism. Also bait (meat for predator insects) can be put in the trap. One of the drawbacks of the traps is that the number of caught insects does not reflect the population density in the given environment, since males and females have different speeds of movement. The insects are caught either for the purpose of mounting, or only for the purpose of identification and are then let out again free or are marked for further follow-up studies. The traps should be emptied approximately every 3, 7 or 10 days. The author acquaints the reader with various findings based on work with these traps and the dominating species found in various localities and times of year.

364. LAPWORTH, C.O.: Measuring Salinity by Conductivity
Journal of Biological Education, 15, 1981, No. 3, pp. 186-187, 4 figs.

The author describes a simple method, which he has tried and successfully used, by which a home-made electrode is used to determine the salinity of river water where the river flows into the sea. The tests require water samples, which can be from deltas or other sources. The arrangement of the apparatus and its readings are described in detail for this interesting experiment.

365. RABOTINSKIY, R.K.: Universalniy auksanometr (A universal auxanometer)
Biologiya v shkole, 55, 1981, No. 4, pp. 44-46. 3 figs.

The author describes the assembly of an auxanometer which measures the growth of plant shoots and how it can be made use of in biology instruction and in school plots of land or in a field.

366. WALLEN, E.T.: Alternative Drosophila Habitat
The American Biology Teacher, 43, 1981, No. 2, pp. 96-97. 2 figs.

Drosophila flies are usually bred in vessels which make it rather difficult to handle the larvae, as well as the adults and their food. The author has tested a new vessel composed of three parts, which can easily be separated and which make it possible to hande the live material without distubing the larvae. A cylinder made of plexi-glass has two slots in it and is closed at both ends with balls of cottonwool. It is thus accessible not only from either end, but also through the slots. The insects can be easily removed and the cylinder cleaned. A detailed description of the apparatus makes it easy to assemble and use.

10.94 Measurement instruments

367. RICHARDSON, J.: Oxygen Meters: Some Practical Considerations
Journal of Biological Education, 15, 1981, No. 2, pp. 105-116. 15 figs., 1 tab.

Oxygen electrodes which are regularly used in industry and research have recently also been adapted for inexpensive use in schools. They make it possible to make measurements smoothly and simply and they do not have the disadvantages of wet chemical methods or the time-consuming measurements made with a manometer. The author extensively describes various measurements suitable for school laboratory work, which he supplements with detailed diagrams and tables.

10.95 Instruments for making images and reproducing sound, film projectors, episcopes, epidiascopes, slide projectors, overhead projectors, tape recorders and desks, radio sets, phonographs, radio-phonographs

368. MAHN, F.: Optické ukazovátko (An optical pointer) Učební pomůcky ve škole a osvětě, 20, 1980/1981, No. 4, pp. 56-58, 5 figs.

In place of a classical wooden or metal pointer, which is fine in daylight in working with such teaching media as pictures or overhead projections, a new optical pointer has been developed for use with slide projections, the projection of cassette films, or with epidiascope and episcope projections. The article describes in detail how to make such a pointer with drawings and a photograph of the final product. It was designed by the staff of VAAZ in Brno. When using an optical pointer an arrow formed by the glowing wire of a bulb is projected.

10.96 Optical instruments, magnifying glasses, mounted magnifiers, microscopes, exposure-meters, cameras.

369. BARDELL, D.: Eyeglasses and the Discovery of the Microscope
The American Biology Teacher, 43, 1981, No. 3, pp. 157--159. 2 figs.

The author describes the history of magnification with the aid of glass since the pre-Christian era, Ptolemy's discoveries, the discoveries of Arab scholars, the medieval opposition of the Church to optical development, up to the use of optical instruments by churchmen in the 14th and 15th centuries. Galileo and his telescope in 1609, in spite of its inadequacies, led to improvements in optics, so that in the middle of the 17th century microscopes were made professionally. This very interesting study is based on original manuscripts kept in libraries and monasteries.

370. NOVACKI, M.: Amatorski mikroscop przenośny
(Amamature portable imcroscope)
Biologia w szkole, 34, 1981, No. 5, pp. 301-304. 3 figs.

An amature portable microscope described by the author, including its accessories, is 75 x 160 x 22 mm large. Its small size and low weight, together with large magnification makes it an ideal microscope for use during field work. It has a universally usable portable holder, which serves as a case. It is composed of the following elements: a manual microscope with 80 - 140x magnification, a light source, staining material (eosine, methyl blue), preservation chemicals (formaline, $K_2Cr_2O_7$, potassium chromate), slides and cover glasses, a box with razors and scalpels.

The microscope has an objective PZO 5/0,12 or 10/0,24 achromatic lens with a magnification of 12-20x (or aplants or orthoplants), one of a series of orthoscopic eyepiece, a Ramsden eyepiece, a Huygens eyepiece and other lenses. The author describes the eyepieces, light source and structure of the microscope and its accessories together with their drawings.

10.97 Areas devoted to instruction and storage of aids - biology workrooms, biology laboratories, biology storage rooms

371. KROPÁČKOVÁ, A.: Využití odborné pracovny v krajském muzeu v Teplicích (Using the biology workroom in the Regional Museum in Teplice)
Přírodní vědy ve Škole, 32, 1980-1981, No. 4, p. 130.

Thanks to the endeavours of the members of the staff of the Regional Museum in Teplice (the husband and wife team of the Flasars), a biology workroom has been made available to school children and students. The biology workroom has 10 showcases devoted to zoology and 4 showcases devoted to botany. All the material in the showcases was selected on the basis of the teaching syllabi for the 6th and 7th classess of basic school and is available to all basic schools in the area. This is an effective means of improving biology instruction and provides teachers with the opportunity to acquaint pupils with professionally arranged collections of natural objects, which are usually not available in schools.

372. Osnovnoye uchebnoye oborudovaniye (Basic teaching aids and equipment)
Biologiya v shkole, 55, 1981, No. 3, pp. 18-19.

A reprint of a part of the new improved teaching syllabus for biology lists all required equipment and teaching aids which biology classwork requires. The list is divided according to type of equipment and teaching aids, separately for botany, zoology, anatomy, physiology, human hygiene and general biology.

11.21 Laboratory work

373. FULTON, M.M.: A Simple Lab Excercise Demonstrating Koch´s Postulates
The American Biology Teacher, 43, 1981, No. 7, pp. 394-396. 2 figs.,2 tabs.

Robert Koch was a world famous bacteriologist who discovered the tuberculosis bacterium, developed specific laboratory methods and formulated certain postulates which are still considered to be valid by modern bacteriology. The author of the article, on the basis of these postulates, describes a school laboratory excercise with the leaves of the tomato plant infected with Brown rot caused by the bacterium Pseudomonas tomato (OKABE, ALTSTATT). He describes both the disease and the pathogenic agent, how to prepare the plant material and the three-week experimental procedure, together with the final assessment and recording of findings. The excercise will, among others, demonstrate to pupils how to use aseptic implements in a microbiological laboratory.

SE

INFORMATION BULLETIN

DIDACTICS OF BIOLOGY

Selective Bibliography 1981

part II

CENTRA SECTIONAL INFORMATION CENTRE OF
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374. KLEIN, S.J.: Why Leaves Turn Color: a Laboratory Model for Hypothesis Formation
The American Biology Teacher, 43, 1981, No. 3, pp.161--163. 1 fig.

Many students who advance to higher classes do not have the skills connected with the formulation of a hypothesis which is needed to begin and carry out a laboratory experiment. For this purpose the author recommends a laboratory experiment whose objective it is to show why oak and maple leaves change their colours. The experiment can be carried out in a large tube and the whole procedure, including an analysis of findings, is described in detail. The experiment is suitable for school laboratories in view of its simplicity and the fact that it requires students to form a hypothesis, assess data and formulate findings.

375. KOSTOVA, Z.: Ispolzovaniye issledovatelskogo podkhoda na laboratornikh zanyatiyakh po obshchey biologii v shkolakh Bolgarskoy Narodnoy Respubliki
(Making use of a research approach to laboratory expercises in the general biology course in the Bulgarian Peoples Republic)
Biologiya v shkole, 55, 1981, No. 1, pp. 52-55.

The development of the creative activity of pupils depends among others on their having independence for seeking new knowledge. For this reason the develpment of cognitive independence and creative thinking in pupils, based on extensively learnt precise knowledge, is one of the most important tasks of a socialist school. Especially in biology a research approach as a part of the didactical system of instruction which makes the process of learning approach the process of scientific cognition is of special importance. The essence of this approach is based on a definition of the problem and the independent seeking of solutions. The basic organizational form of this approach are practical excercises, which make it possible to solve the following methodological objectives:

- to form an awareness of the stages and methods of scientific research in biology;
- to teach pupils scientific terms and notions;
- to develop creative thinking and a dialectical and materialistic worldview;
- to form habits needed for independent work, on the basis of an organized learning and seeking process.

Depending on the nature of the problem to be solved, it is possible to organize laboratory excercises either before or after the theoretical aspects of the problem have been dealt with. Both approaches are demonstrated by the author on the basis of the example of the topic Enzymes. The structure of the two laboratory excercises recommended is that of a research approach: determining the problem, forming a hypothesis, carrying out the experiment, assessing the data, formulating findings and conclusions. Experiments are effective when, on the basis of an extensive analysis and synthesis of empirical data, the pupils are able to formulate theoretical conclusions.

376. LEONARD, W.H.: Laboratory Instruction is on Trail? The American Biology Teacher, 43, 1981, No. 8, pp. 445-447.

Laboratory excercises as a form of biology teaching are assessed in different ways, sometimes as making a positive contribution, while at other times in a negative manner. Students spend too little time in the laboratory and often teachers only submit to them findings of experiments done by someone else. The author discusses in detail the problem of laboratory excercises from various points of view and comes to the conclusion, as many others have done before him, that laboratory excercises should remain the predominating component of natural science instruction, since the findings of psychology, as well as educational research, and just common sense stress their importance. The article calls upon science teachers who are today teaching tomorrow's scientists, to do a maximum of experiments.

377. MAZO, V.B.: *Razvitiye umeniy i navikov raboti s opticheskimi priborami* (Developing skills and methods of work with optical instruments)
Biologiya v shkole, 55, 1981, No. 2, pp. 47-50.

The optimalization of the teaching process also requires the correst forming of skills which pupils need to work with a microscope and a magnifying glass. Pupils should acquire these skills already in the fifth class, so that during classwork in the 6th to 10th classes they will be able to use these skills in the study of various biological specialisations. The article describes in detail how to proceed in forming skills connected with microscopy during 4 lessons devoted to the topic The cell in the 5th class. The pupils learn not only the subject-matter itself but they also look at various examples of cell structures in plants and learn to use a magnifying glass and a microscope. This will make future laboratory excercises more effective.

11.22 Practical excercises in biology

378. BERGQUIST, B.L.: Dandelion Floral Stems: A Model for Teaching Cellular Tonicity
The American Biology Teacher, 43, 1981, No. 1, pp. 45-47. 2 figs.

The author describes a laboratory excercise which has the objective of acquainting pupils with one of the basic principle of biological systems - the movement of water through cellular membranes. The floral stems of dandelions, cut to a uniform lengh of 6 cm, with a slanted width of cutting 3 mm, are submerged into three different solutions of NaCl - from 0.7 % to 1.3 %. The submerging must be done quickly, so that it is carried out at almost the same time. After 2 minutes we can begin to observe a disfiguration of the stem: the hypertonic or hypotonic solution causes a rounded curve and the isotonic solution a flat shape. The author explains these phenomena in an extensive exposition. He considers the described method as one of the best ways of explaining to pupils the problem of cellular tonicity.

379. BOHÁČ, D.: Etologická hlediska ve výuce zoologie v 6. ročníku základní školy (Ethological aspects in zoology teaching in the 6th class of basic school)
Přírodní vědy ve škole, 32, 1980/1981, No. 3, pp. 84-87.

Ethology is one of the youngest zoological disciplines, which to an increasing extent is making its way into school teaching syllabi. Ethology studies specific forms and laws of development of the behaviour of various species and attempts to explain this behaviour on the basis of an analysis of its causes.

Ethology is closely linked to a number of other zoological specializations, especially animal psychology and sociology. The author characterizes the most important terms used by special ethology (imprinting, ritualization, etc.) and also describes various forms of animal behaviour such as daily and nocturnal rhythms, defence against enemies, rest and sleep, animal sociology, etc. The study of ethology is not only important from a theoretical point of view, but also for applied science and for this reason should also be taught already in basic school.

380. JURČÁK, J.: Podeňka v praktických cvičeních z botaniky (The spiderwort in practical excercises in botany)
Přírodní vědy ve škole, 32, 1980/1981, No. 2, pp. 44-47. 15 figs.

This article will be useful for teachers organizing practical excercises in botany in secondary schools. The advantage of the spiderwort as experimental plant material is in the fact that it is readily available at all times of the year and can easily be propagated in a vegetative manner. Also the economic aspect should be taken into account. After a detailed classification of the spiderwort and its description, the author describes various opportunities the plant provides for anatomical observations. A total of 17 assignments for microscopy are described, which were chosen especially from the point of view of plant physiology. But also other uses of this versatile plant in the classroom could be cited.

381. KLOB, W.: Vergleich von Absorptions- und Aktionsspektrum eine Schülerübung zur Photosynthese im Leistungskurs Biologie (A comparison between an absorption and emission spectrum as an excercise done by pupils on photosynthesis in the biology course in the final year of secondary school)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 3, pp. 88-94. 6 figs.

This program for a practical excercise has been developed for the final class of secondary school and concerns a comparison of an absorption and emission spectrum within the framework of photosynthesis, together with a study of the effects of green pigments on plants. As experimental objects the author recommends the Forsythia shrub and the Elodea waterweed. The method used is based on counting oxygen bubbles produced by the waterweed. Pupils work in groups and pass tasks on to each other. Two teaching lessons are required for the excercise and a spectral photometer and colour filters made of plastic are needed.

382. McLACHLAN, J.C.: Chorio-Allantoic Membrane Grafting of Chick Limb Buds as a Class Practical
Journal of Biological Education, 15, 1981, No. 3, pp. 234-238. 2 figs.

The author describes a method of carrying out a transplantation of chicken limb buds, which substantially decreases the time needed for such a procedure and does not require special skills. Also the apparatus required in minimal. The whole operation, which previously required several days, can be done in three hours on the basis of the described procedure. The technique described by the author can be undertaken as a school practical excercise by groups of students.

While one pair of students prepare the membrane, another pair prepare the host chicken. A microscope and very fine pincers are needed.

383. POWELL, J.A. - PITKIN, R.B.: Laboratory on Organ Culture of Chick Heart Embryos
The American Biology Teacher, 43, 1981, No. 1, pp.43-44.

The excercise described in the article extends the usual observations of a live chicken embryo usually done by students. In the first stage the students become acquainted with the embryo´s anatomy. In the second stage they are asked to distinguish several vital organs and to determine their location. In the third and main stage of the excercise the students observe a beating heart and describe its parts and functions. The teacher should have questions prepared, which the students should answer, or the teacher himself can answer them during the demonstration. At the same time the students should learn how to keep the embryo alive for several weeks. For this purpose the author provides recipes for various cultivating mediums.

384. ŠLÉGL, J.: Konduktometrické sledování vitality tkání (The conductometric study of tissue vitality)
Přírodní vědy ve škole, 32, 1980/1981, No. 3, pp. 82-83.

Chemical and physical methods are widely used in biological research and thus should not be overlooked in school biology. The article contributes to extending the subject-matter connected to the use of precise bio-physical methods in practical biology excercises in secondary school. The conductometric study of tissues also implements interdisciplinary relations with physics. Conductometry deals with measuring the transmission of electrical current through various substances. The theoretical part of the article, which deals with the conductometric method, continues with instructions for carrying out the practical experiment, on the basis of which it is possible to determine which part of a carp fish dies first and which takes the longest to die. The measurements are carried out on the basis of the simplest comparative method - with a Wheatson bridge.

385. ZIPKO, S.J.: An Interdisciplinary Approach to Dinosaur Fossils, Ecology, Morphology and Energetics
The American Biology teacher, 43, 1981, No. 8, pp. 430-439. 13 figs.

Dinosaurs, who became extinct about 65 - 70 million years ago, have until now been considered to be unintelligent animals who became extinct because of their inability to adapt to changing natural conditions. Research in the last 15 years has, however, indicated that such hypotheses have not been correct. On this basis the author designed an excercise for pupils, which is based on a simulated finding of Dinosaur bones on the basis of which conclusions can be made about their way of life, morphology and the ecology of their environment, as well as the causes of their becoming extinct. At the same time the author discusses the life of other prehistoric vertebrates, who lived under the same conditions as the Dinosaurs.

11.23 Hobby clubs

386. ANDERS, B.: Zur inhaltlicher Gestaltung einer AGR "Microbiologie" unter besonderer Berücksichtigung des Phytoplanktons heimatlicher Gewässer (Concerning the concept of the subject-matter to which the hobby club "Microbiology" is devoted, with special stress on the phytoplankton of domestic waters).
Biologie in der Schule, 30, 1981, No. 11, pp. 464-466.

Algae are specially suitable objects of study. The author recommends the use of phytoplankton found in domestic flowing and stagnant waters. Preparing microscopical specimens of algae is not difficult. The author also lists various apparatus and other facilities which a hobby club must have for these experiments and observations. If research assignments for individual members are introduced - and the author provides a list of such assignments - the activities of a hobby club will improve.

287. DUNDA, K.: Problémy a řízení přírodovědné zájmové činnosti (Problems connected with the supervision of nature science hobby club activities)
Přírodní vědy ve škole, 32, 1980/1981, No. 3, pp. 89-90.

Nature science hobby club activities are in fact extracurricula activities. They are often organized by the Young Pioneer Organization in hobby clubs attached to schools, but also by other organizations, such as those organized by the organizations of fishers, hunters, bee-keepers, breeders of small domestic animals, orchard keepers and gardeners. The fact that so many organizations are involved in hobby club activities for school children brings with it a number of problems. Effective supervision requires a complex and comprehensive approach and cannot be reduced to mere organizational aspects. The methodological and subject-matter aspects of hobby club activities should recieve priority.

388. EISENHABER, F.: Stand und Entwicklungstendenzen in der AGR "Mikrobiologie" (The situation and development trends of the "Microbiology" hobby club)
Biologie in der Schule, 30, 1981, No. 11, pp. 469-474. 5 tabs.

On the basis of an analysis of the relevant literature, and the author's own practical experiences, the activities of the "Microbiology" hobby club are analysed for the period since 1970. Problems have appeared especially as far as objectives are concerned, which require the application of philosophical point of view. The author makes various recommendations for improving the activities of hobby clubs in general. Pupils should participate in planning the hobby club's activities and greater use should be made of the advantages of elective courses. Also the opinions of pupils concerning elective courses are cited.

389. GENKOVA, L.: Izvnklasna deynost posvetena na 1300 godishninata na blgarskata drzhava (Extracurricula activities aimed at the 1300th anniversary of the Bulgarian state)
Biologiya i khimiya, 24, 1981, No. 1, pp. 56-60.

The author provides a number of suggestions for hobby club and other extracurricula activities of pupils. In this activity, pupils should become acquainted with the history of various scientific disciplines on the basis of how they were developed in Bulgaria, due to the activities of outstanding natural scientists.

390. KADIYEV, I.: Fosilnoto nakhodishche pri selo Bozhuritsa Plevensko (A fossile site near Bozhurice in the Pleven region)
Biologiya i khimiya, 24, 1981, No. 2, pp. 56-59.

Schools in the Pleven region have several hobby clubs devoted to paleontology which have as members pupils from the 5th to 7th classes. In their leisure-time, these pupils learn about their native region, especially from a geological point of view and they study the remnants of living organisms from the so-called Boden Sea. The remnants of various specie of corals, bivalves, limaidae, as well as the imprints of bristle worms and other invertebrates are studied. The pupils find these fossils, classify them and organize collections.

391. KALUGIN, A.I.: Nash kruzhok biologii morya (Our marine biology hobby club)
Biologiya v shkole, 55, 1981, No. 3, pp. 44-46.

The author describes the activities of a biology hobby club devoted to marine biology as an example of how such activities can make use of local conditions. Pupils from the 7th class meet once a week and gradually become acquainted with marine research; at first with generalized problems and the methods used (marine biology as a science, basic research methods used), and later with the opportunities provided by excursions to the seashore, including the study of the variability of algae, coelenterata, marine anthropods and molluscs. The work done by the hobby club has a positive effect on developing pupils' independence and their future vocational choice.

392. LERCHNER, W.: Genetische Untersuchungen in Arbeitsgemeinschaften - auch im Biologieunterricht ?
(Genetic studies in hobby clubs - and also in biology instruction ?)
Biologie in der Schule, 30, 1981, No. 6, pp. 230-236.
2 figs., 1 tab.

According to the teaching syllabus for the 10th class, the molecular principles of heredity and the laws of heredity should be taught, as well as changes in dispositions and heredity in man. This subject-matter is then again taken up in the 12th class. Problems arise especially with teaching molecular genetics (where the material is not very ostensive); this can be partially overcome by the use of models. The author considers it very important to carry out simple genetical experiments and cytological studies. He cites the Drosophila fly and the tomato as suitable objects for these experiments. In view of the fact that these experiments are rather time-consuming it is often necessary to carry them out in elective courses or in hobby clubs. The author also suggests various suitable objects for observations and also experiments in the cross-breeding of the Drosophila fly to determine monohybridism and dihybridism.

393. MUSIL, J.: K osobnosti vedoucího v zájmové přírodovědné činnosti (The personality of the supervisor in natural science hobby club activities)
Přírodní vědy ve škole, 32, 1980/1981, No. 10,
pp. 369-370.

The author sums up existing ideas concerning the activities of a natural science hobby club. He concentrates on the forming of those prerequisites and the required background which such a person should have, rather than on the methodology of this type of work with a group of children. From this point of view, someone who supervises children´s natural science hobby clubs should, besides generally required qualifications, such as education, political maturity and having a good approach to young people, also have organizational skills and skills required for cooperation with others, as well as an orientation towards some natural science discipline. The supervisor of a natural science hobby club should gradually gain basic psychological and pedagogical knowledge on the basis of his or her own studies. The independent work done by such a person should also include the forming and extension of collections of natural objects and aids. On the basis of his or her knowledge of nature and an active interest in nature he or she should serve as a model and reliable advisor to the children who are members of the hobby club.

394. RAYNCVA, Y.Y.: *Organizirane na opitno-izsledovatelskata deynost na uchenitsite izvnklasnite formi po biologiya* (The organizing of experimental research activities of pupil in extracurricula forms of biology instruction)
Biologiya i khimiya, *24*, 1981, No. 4, pp. 24-27.

The extracurricula activities of pupils are important for their vocational guidance and can also serve to develop the pupils´ interest in their native region. The author illustrates this by providing examples of the activities of a hobby club of about 25 pupils from the 5th and 6th classes, which concentrates on the cultivation of two different varieties of maize and also the implementation of nature conservation measures in the vicinity of the school. In planning extracurricula activities, a questionnaire was administered, which indicated that 57 % of the pupils are interested in practical biology; of this number, 32 % expressed the hope of becoming veterinary surgeons, zoologists, to work with various agricultural machines, as crop technicians and in other agricultural specializations.

395. RAZBESOV, O.K.: *V pomoshch krushku yunikh akvariyumistov* (Helping a hobby club of young aquarium keepers)
Biologiya v shkole, *55*, 1981, No. 2, pp. 71-75.

The author sums up basic knowledge concerning the founding and maintaining of an aquarium, the demands various species of fish make on the aquarium, types of plants which can be planted in an aquarium, and other problems which will be of interest to beginners.

396. SCHAEFFER, H.: *AGR "Microbiologie" contra "Nosematose"* (The "Microbiology" hobby club versus the "Nosema disease" hobby club)
Biologie in der Schule, *30*, 1981, No. 11, pp. 467-469.
3 figs.

The author has chosen the subject-matter dealt with by hobby clubs in such a way that pupils give priority to problems which are important from an economic point of view. One such problem emerged on the basis of cooperation with bee-keepers. Since 1975 the Nosema disease has developed in the Schwerin region, and more than 5000 bee colonies, which represents a loss of 50 tons of honey, have been lost due to the disease. The pupils recieved 2 assignments; to study under a microscope bee samples in order to diagnose the disease and to participate in preparing educational material for bee-keepers. The author describes in detail how these two tasks were done.

397. SCHMOLKE, H.G.: Aus der Arbeit einer AGR "Bodenfruchtbarkeit" (Concerning the activities of a hobby club for "Soil Fertility")
Biologie in der Schule, 30, 1981, No. 11, pp. 474-475.

The hobby club cited in the title was founded in 1973 and closely cooperates with gardeners and those who breed small domestic animals. The representatives of these organizations every autumn give to the supervisors of these hobby clubs soil samples, which the hobby club members then analyse. The findings of the analyses, together with recommendations for fertilization, are then returned to the representatives of these organizations. The author describes the methodology of these activities in detail - for instance the determination of pH, Ca^{2+}, etc.

398. TREITZ, P.: "Tiere mit schlechtem Image". 10 Amphibien und 3 Reptilienarten im Landkreis Neukirchen (Saarland) ("Animals with bad images". 10 species of amphibians and 3 species of reptiles in the region of Neukirchen (Saarland)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 4, pp. 125-126. 2 photos.

A nature conservation hobby club in Illingen has carried out a large-scale research project to determine the size and specie composition of locally found amphibians and reptiles. In the Neukirchen region only 10 species of amphibians and 3 species of reptiles were found. The article describes various species, their biology and habitat. The hobby club is now preparing an Atlas of Amphibians and Reptiles in the Saarland. Its activities can serve as a model for nature conservation hobby club activities.

11.25 Group teaching

399. MORINOVA, B.: Obranata vrzka v chasovete za uchebna podgotovka i grupovata forma na rabota po biologiya v uchilishcheto-poluinternat (Feedback between time devoted to preparing for class and group work in biology in semi-boarding type schools)
Biologiya i khimiya, 24, 1981, No. 2, pp. 51-54.

In semi-boarding type schools time devoted to preparing for class and group work are both done under the supervision of a teacher. Creative assignments are given to pupils of both a theoretical and practical nature. The teacher should plan, organize, supervise and control all the cognitive activities of the pupils. Group work is carried out in the 6th to 8th classes and is differentiated according to the abilities of the pupils.

11.32 Excursions, hiking camps

400. AUXERRÉ-BARDOT-DOUSSAL: Les faluns du Miocéne en Tourraine et en Blésois (Miocene shell-marls in Tourraine and Blésois)
Biologie-Géologie, 68, 1981, No. 2, pp. 495-530. 6 figs.

The subject-matter of this extensive article are the shell-marls of paleolithic sediments which contain the fragments of huge numbers of shells of extinct céphalopoda. The authors undertook the difficult task of extracting and identifying various species of shells and classifying them into summary tables together with their characteristics. The tables are accompanied by excellent commentaries, assessments and indices. This article is another contribution to the systematic study of paleontological sediments in the region of Tourraine and Blésois in France.

401. BIAŁECKA, : Wycieczki sozologiczne w dolinie Górnej soży (Conservationist excursions into the valley of the Górna soża river)
Biologia w szkole, 34, 1981, pp. 29-35, No. 1.

The valleys of highland rivers are often the site of settlements, the development of industry, tourism and recreation. An anthropological study of the landscape provides a mosaic which contains the outcome of the endeavours of various civilizations (agricultural, industrial, present-day) upon the landscape. It is constantly undergoing further changes in which the primary characteristics of the landscape are disappearing and new cosmopolitan characteristics are developed. These changes can be observed during a sozological excursion, which concentrates on observations concerning nature and environmental conservation (sozology is conservation theory). On this basis it is then possible to plan the conservations of various biocoenoses. The author specifically describes such an excursion to the highland valley of the Górna soła river, which provides the prerequisites for attaining a general overview and historical perspective of the contemporary landscape, which in turn makes it possible to take appropriate conservation measures. Before the excursion, such basic terms as the landscape, the primary landscape, the natural landscape, the cultural landscape, a cultural harmonious landscape, a dis-harmonious (devastated) landscape and an artificial landscape should be learnt. During the excursion itself the pupils become acquainted with the local type of architecture and with various changes which have occured in the landscape. The sociological diagnosis of the landscape concerns the degree of human intervention into it and the degree of "health" or "disease" of a specific landscape. During the excursion the pupils carry out observations, make documentation with the help of drawings, photographs and notes. After the excursion, the material gathered should be analysed and assessed. Also the area chosen for the excursion is described in detail (including is topography, the trail and goal of the excursion, etc.).

402. BOJASIŃSKI, T.: Obserwacje entomologiczne w terenie.
(Entomological observations in the field)
Biologia w szkole, 34, 1981, No. 3, pp. 172-178. 4 photos.

Insects are of interest to a number of scientific disciplines, for instance entomology, genetics, bio-chemistry, physiology, ecology, ethology, systematics, zoogeography, phyto-geography and evolution. For this reason modern biology instruction also includes a study of insects. Entomological observations can be carried out during field trips, which can be undertaken throughout the year, including the winter, when insects can be observed or collected under the bark of trees, in the soil of the forest, in moss, etc. The best time to organize an entomological field excursion is at the time we can find imagines, i.e. in the spring when trees are in bloom and the weather is nice. The author describes the needed instruments and other material for such excursions. The author also recommends that before the excursion itself the teacher organize a pre-excursion to inspect the terrain where the excursion will take place and the incidence of insects. The hunting or collection of insects should not be considered as foremost, but rather their observation in a natural environment. Those insects which are collected should also first be observed, identified and then let free again. During entomological excursions, care should be taken to maintain all nature conservation principles. The best place to carry out the collection of insects is in the ecotone, i.e. the areas of transition between two different biotopes, for instance the border between a forest and field, meadow and shrubs, etc. The insects should be observed in their environment, i.e. in flowers, on the sap of trees, in the hollows of old trees, under logs, in water and near the water, etc. The insects should be observed in a test tube, in a demonstration pipette, a pill box or bottle, with the naked eye and with a magnifying glass, water insects in a vessel with water. The behaviour of water insects can then be observed in an aquarium. If we decide to breed insects, then it is possible to observe their food intake, their reaction to fear, shape of body, colouring, behaviour, method od movement when running away, etc.

403. FREJLAK, S.: Życie mrówki rudnicy w mrowisku i jego otoczeniu (The life of the red ant in an ant hill and its vicinity)
Biologia w szkole, 34, 1981, No. 3, pp. 168-172. 2 figs.

The author here suggests a study of the red ant as a representative of insects; this subject-matter is relevant to the teaching of zoology, morphology and general biology. The field work is suitable for the 5th and 7th classes of basic school. First pupils should be acquainted with the notion of societal insects, their social life and differences in the biology of the red ant and other ants. Pupils should also learn how to observe insects outdoors and especially the usefulness of this specie, which should be documented during the field excursion. The observations can be carried out as group work. The excursion should follow the topic Anthropoda in the zoology course. The article describes in detail the work of five different groups of pupils, where each group has a different assignment. These include the position of the ant hill in the surrounding terrain, the vicinity of the ant hill, its climatic conditions, its size and the material it is made of, the movement of the ants and the roads which lead to the ant hill, the transporation of material and food by the ants into the ant hill, the reaction of the ants to obstacles on their roads, defensive movements, methods of fighting, the care devoted by ants to pupa, distinguishing individual ants, plants growing in the vicinity of the ant hill and other animals found in an ant hill. The relation of the plants growing in the vicinity of the ant hill to the ant hill should be analysed, because ants tend to disseminate some types of plants, by eating the seeds of some plants and thus disseminating them on the roads they use. The pupils can also draw the ant hill, its shape, position, surrounding terrain, individual ants, etc. The need to protect and conserve the ant hill should be stressed.

404. GÄRTNER, M.: Zur konkreten Auswertung der Wirkungen der abiotischen Faktoren während der biologischen Exkursion (A specific assessment of the effects of abiotic factors in the course of a biology excursion)
Biologie in der Schule. 30, 1981, No. 5, pp. 189-193.
3 figs., 1 tab.

The teaching syllabus for the 9th and/or 11th class assumes instruction concerning the importance of abiotic factors, such as light, temperature and relative humidity, on biological processes. Often teachers are satisfied with only meantioning these factors, but they should at least be measured. With the factor of light its minimum and optimum can be determined. It should be pointed out that plants make use of only 1-2% of the light available. Pupils can measure the amount of radiation available in June or July. Temperature has been the subject of another article. As far as relative humidity is concerned, what has been learnt in geography should be made use of. This factor can be measured with the aid of a portable instrument, which can be made on the basis of instructions provided by the author.

405. GOTTSCHLICH, G.: Exkursion zum Thema: Anpassungsstrategien und ihre Ursachen bei Xerophyten. Beiträge zur Integration des Informationsangebots botanischer Gärten in der Ökologieunterricht der Sekundarstuffe II. (An excursion topic: The adaptation strategy of xerophytic vegetation. A contribution to the integration of information supplied by botanical gardens into ecology instruction in the upper classes of secondary school) Der Biologieunterricht, 17, 1981, No. 4, pp. 45-68. 3 worksheets, 9 figs.

While xerophytic plants are already discussed in the lower classes of secondary school, they are taught in greater detail (including their morphology, anatomy and physiology) in the upper classes of secondary school, where phyto-geographical aspects are added to the others. A number of plants belong to the xerophytes and they all have in common an adaptation to an arid environment or to an environment with very unevenly distributed availability of water during the vegetation period. Xerophytes can be divided into ephemeral plants (which very rapidly form seeds and complete their vegetation cycle, even during several days), geophytes (which survive dry periods in the soil in the form of bulbs, tubers or shoots), tropophytes (which change their appearance during the vegetation period, for instance by shedding their leaves), succulents (which have the ability to store water either in stems - as stem succulents, or in leaves - leaf succulents) and finally plants capable of living without water during the vegetation period (some types of moss found on sunny rocky slopes). The author recommends making use of the collections found in botanical gardens to organize an excursion, which would acquaint pupils with xeryophytic plants, their most important species and where they are found. He discusses the original geographical distribution of xerophytes and deals in greater detail with the following families: Euphorbiaceae, Cactaceae, Didieraceae, Bromeliaceae and Crassullaceae. On the basis of specific examples, the anatomical, morphological, and physiological specific characteristics of xerophytes are discribed.

406. HUMPHREYS, T.J.: Estuarine Ecology as Project Work Journal of Biological Education, 15, 1981, No. 3, pp. 225-233, 5 figs., 1 tab.

Organisms which live in the estuaries of large rivers face especially difficult conditions. Large fluctuations in the salinity and speed of the water, large differences in temperature, depth, etc. all influence these organisms; thus they can serve as excellent objects for study in practical ecology. The author describes in detail such a project, its organization, safety measures, technical aspects and also how to measure salinity, water density, turbidity, bacterial content and also how to analyse sediments in the laboratory where microscopical studies of water samples can also be carried out. The flora and fauna found in delta areas can then be summed up in the form of a table. The project is suitable for students in the upper classes of secondary school.

407. HUNDT, R.: Ökologische Beobachtungen in winterlicher Kulturlandschaft (II.). Untersuchung von Pflanzenbeständen mit Hilfe von Zeigerarten (Ecological observations in a winter cultural landscape (II). A study of plants with the help of indicators)
Biologie in der Schule, 30, 1981, No 4, pp. 129-136.
1 fig., 2 tabs.

Carrying out various ecological observations can be done for instance by comparing the plant cover of a northern and southern slope. On the basis of such a comparison pupils can achieve an understanding of abiotic factors and the behaviour of organisms and/or populations. The author describes three assignments given to pupils, which each contains a formulation of the problem, a hypothesis, how the project was carried out and an assessment of the data obtained.

408. HUNDT, R.: Ökologische Beobachtungen und Untersuchungen in der winterlichen Kulturlandschaft
(Ecological observations and studies in a winter cultural landscape. Part I)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 57-59.
24 figs., 6 tabs.

The article deals with the new biology curriculum for the 11th class. A newly included excursion makes it possible for pupils to achieve an understanding of the relations which exist within eco-systems and the interaction between nature and society. Undertaking this excursion in the winter was tried out by teachers in the Suhl region. The author cites 8 different assignments concerning ecological observations, which can be given to pupils. Each assignment includes a hypothesis, instructions for a carrying out the assignment, for recording and documenting data and assessing findings. The assignments concentrate on the following: 1. Determining the relation between the form of the landscape and the incidence of meadows and fields with no snow cover. 2. Determining the causes of various depths of the snow cover, 3. Determining temperature differences in a mole hill and its surroundings. 4. Determining temperature differences in a group of pine trees. 5. Determining differences in the temperature of the air in the vicinity of a stream. 6. Determining daily differences in temperature of water in a stream. 7. Determining daily changes in air temperature on the southern and southeastern slopes of a beech forest. 8. Determining temperature differences in specific parts of meadows found at the edge of a forest or divided by groups of trees.

409. KINTZEL, W.: Zur Gestaltung der ökologischen Exkursion in Klasse 11 (Concerning the approach to ecological excursions in the 11th class)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 76-79.

The article deals with the new biology teaching syllabus for the 11th class. The author's recommendations concern two eco-systems which are typical for the nothern part of the G.D.R. - peat bogs and dry sand pits. First the author briefly deals with the significance of ecological observations and then he describes the site of the excursions and especially the indicative plants found there. Suggestions are made for assignments concerning abiotic factors and their influence on an organism and the influence of organisms on abiotic factors. The author for instance recommends weighing the roots and plant axis of xerophytes and hydrophytes, determining the intensity of light and temperature in grass growths, among trees, studying pollination agents, the incidence of birds, etc.

410. KOZIREVA, A.V.: Exkursiya na paseku (An excursion to a bee hive)
Biologiya v shkole, 55, 1981, No. 5, pp. 67-69.

The author recommends three excursions to a bee hive, so that pupils become acquainted with the work of bee keepers in various seasons, in the spring, summer and autumn. Each excursion has a specific objective and as a whole they will have a positive effect on persuading pupils they may like to become bee keepers.

411. KRISCH, H.: Hinweise und kleine Bibliography zur Arbeit mit Faktorenzahlen und ökologisch-soziologischen Artengruppen (References and a small bibliography concerning factor numbers and ecological and sociological groups of species)
Biologie in der Schule, 30, 1981, No. 4, 136-143. 2 tabs.

On the basis of the author's own experiences, gained in the further education of teachers, he makes various suggestions and recommendations for ecological excursions in the 11th class. In ecology teaching, excursions are very important. Methodological handbooks, however, contain certain errors and imprecise information. During excursions, pupils should make lists of all plants as far as possible. An assessment of a specific vegetation cover is facilitated by the use of factor numbers, which also make it easier to compare various biotopes. The idea of assessing the ecological behaviour of various species in relation to their environment on the basis of a numerical factor is not new, Ellenberg used a scale of 1 to 9, and for aquatic plants also the number 10, 11, 12. Increasing demands made upon a specific factor are expressed by higher numbers. In conclusion, the author provides a bibliography of the most important literature on the subject which can be used in preparing an excursion.

412. MAUERSBERGER, G.: Hinweise zur Exkursion der 11. Klassen in vollzügigen EOS (Instructions for excursions in the 11th class of general education secondary schools)
Biologie in der Schule, 30, 1981, No. 2/3, p. 8o.

In general education secondary schools in large cities certain problems can appear when organizing excursions, because the teacher is absent from other classes, the lessons lost because of the excursion must be substitued for and there is a general lack of time. The author therefore makes several suggestions for dealing with this problem - for instance carrying out the excursion with two classes at one time and perhaps combining a biology excursion with an excursion in some other teaching subject.

413. QUACKENBUSCH, R.E.: Whale Watching - A Unique Field Trip
The American Biology Teacher, 43, 1981, No. 8, pp. 456-459. 6 figs.

The article is addressed to biology teachers. It describes a trip by ship to observe the behaviour of whales. Already the first encounter with a whale proved to be quite an experience. Its submerging and surfacing and its squirting of water when breathing, as well as movements of the tail fin and the huge force emanating from the animal could all be observed. In spite of the fact that whales are on the list of threatened animals and in spite of the moratorium on their hunting, which is being maintained by all countries with the exception of two,whales are constantly decreasing in numbers. The article can serve as a source of information about the life cycle of these facinating mammals.

414. QUASIGROCH, G.: Über den Bau und die Fortpflanzung einiger Algen (On the structure and reproduction of some Algae)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 2, pp. 37-64. 7 figs.

The students at the University of Osnabrück participated in an excursion to Helgoland, where they collected marine algae. On the basis of the collected samples the students then studied marine algae, their ecology, systematics and practical importance for man. Also various classes of marine algae were dealt with, including the green algea (Chloropyceae), brown algae (Phaeophyceae) and red algae (Rhodophyceae). The students made diagrams to illustrate their reproduction, sexuality, the alternation of sexual and non-sexual generations, etc. Among the green algae, the Ulothrix are described in detail and the Cladophora; among the brown algae the Cutleria and among the red algae, Batrachium and Ceramium. Comparative tables include various diacritical characteristics.

415. ROŠICKÁ, L.: Hydrobiologická exkurze do Polabí pro 6. ročník základní školy (A hydrobiological excursion to the Elbe river valley for pupils of the 6th class of basic school)
Přírodní vědy ve škole, 32, 1980/1981, No. 9, pp.330-332.

An excursion makes it possible to observe and study organisms in their natural habitat and also to collect specimens for school collections and for laboratory experiments. Usually three categories of excursions should be distinguished: special, comprehensive and concerning a single topic. The author recommends a special excursion for pupils of the 6th class on organisms living in water. A hydrobiological excursion to the Elbe river valley is especially suitable for pupils from Prague schools, as well as those from schools in the Central Bohemian Region. The article provides a characteristic of the area, the species of invertebrates which can be found and in conclusion also the flora typical for the area.

416. THORPE, P.: Exploring Trees in Autumn
Natural Science in the Schools, 19, 1981, No. 2,
pp. 41_42.

Autumn nature can provide a number of impulses for children during art lessons. Also biology lessons can deal with the question of why trees change colour and why leaves are shed. The predominance of red, brown and yellow as the colours of autumn lead to a number of questions which the author answers in a very interesting manner. Autumn also provides an invitation to study more closely the various insects which can be found in fallen leaves. Thus the article provides recommendations for organizing an interesting excursion, combined with enjoyable work and learning.

417. VITKOVA, M.: Ekskurziite po biologiya kato sredstvo za profesionalno samoopredelenie na uchenitsite (Biology excursions as a means of vocational self-determination of pupils)
Biologiya i khimiya, 24, 1981, No. 6, pp. 46-49.

A model socialist industrial enterprise should be chosen as the place for organising a school excursion. The pupils should first become acquainted with the advantages of a socialist way of working, with the foundations of the relevant sciences and with the problems they may encounter in the enterprise; finally they should receive specific information to help them in making a vocational choice. Within the framework of biology instruction, such excursions can concern an number of topics, such as "Photosynthesis", "The growth and development of organisms", "Genetics and selection", etc. The author describes in detail an excursion with pupils of the 10th class to the Research Institute for Animal Nutrition, where the pupils became acquainted with various zoo-technological methods and selection methods. The teacher should prepare for the excursion very thoroughly; preparations should include the formulation of questions, giving assignments, etc.

11.33 Socially beneficial work

418. GAWŁONSKA, J. - KUSIŃSKA, M. - CZERSKI, W.:
Podstawowe zagadnenie zidarstwa w pracy szkolnej
(Basic problems of medicinal plants in school work)
Biologia w szkole, 34, 1981, No. 5, pp. 283-294.
4 figs., 2 tabs.

Dealing with problems concerning medicinal plants requires not only botanical knowledge, but also knowledge of plant cultivation, pedology, chemistry and pharmacology. In school, pupils should become acquainted with various specie of medicinal plants, where they can be found growing wildly, whether and how they can be cultivated, how they are utilized for the making of drugs, problems connected with the conservation of wildly growing plants, especially those which are protected or threatened and also problems connected with the adaptation of medicinal plants from elsewhere to growing in the wild. The annual consumption of medicinal plants in Poland is 15-25 thousand tons. The wide-

-spread use of chemicals in agriculture, as well as land reclamation continue to narrow down the opportunities for collecting medicinal plants. The authors divide medicinal plants into 7 groups (cultivated, those which grow on a mass scale wildly, those that grow wildly on a mass scale but in a widely diffused area, plants which require pure cultures, rare plants and those protected by the law). For each group the authors cite species most often collected, describe their habitat and the plants themselves. Since 1945 schools in Poland have been collecting medicinal plants. The authors provide various practical recommendations for the collection of medicinal plants by school children and also a calendar of collecting activities.

419. NOVÁK, J.: Sběr léčivých rostlin - významná pomoc farmaceutickému průmyslu (The collection of medicinal plants as an important aid to the pharmaceutical industry)
Přírodní vědy ve škole, 32, 1980/1981, No. 9, p. 323.

Medicinal plants are an important source of raw materials for the pharmaceutical industry, needed for producing about one third of all drugs. Providing these medicinal plants is a very important task . School children make a decisive contribution to this task. The basic significance of these plants can be summed up in the following:

1. Medicinal plants provide substance, which cannot be made synthetically by chemicals or only at a very high cost.
2. They serve for the making of various teas and brews which have a specific effect and often support the impact of other drugs.

3. They are used for making galenical substances, which have a comprehensive effect.

4. Substances isolated from medicinal plants serve as models for the making synthetic substitutes.

Botany teaching in basic and secondary school provides good opportunities for pointing out to pupils the usefulness and social benefit accruing from this group of plants.

11.4 Biology Olympiads, biological competitions

420. BERUTSINA, L.P.: O Vserossiyskoy biologicheskoy olimpiade shkolnikov (On the All-Russian Biology Olympiad of pupils)
Biologiya v shkole, 55, 1981, No. 1, pp. 63-67.

On the basis of a decision of the Ministry of Education of the RSFSR, an All-Russian Biology Olympiad was held in 1981. The decree of the Ministry also formulates the objectives of the BO:

- to increase the interest of pupils in biology and nature conservation;
- to improve the quality of various forms of extracurricula and leisure-time activities of pupils;
- to help older pupils in the making of a vocational choice;
- gaining the active support and help of teachers, university students and scientists in helping schools.

The BO has 4 rounds: 1) the school round (for pupils of the 7th to 10th classes), 2) the town or distric round, 3) the regional round (including the oblasti and republics) and 4) the All-Russian round. The All-Russian round was held on March 24th to 27th

in Barnaul, for pupils from the 7th to 10th classes. It had two parts (each of which lasted 4 hours)
- a theoretical part (a written essay concerning 6 questions)
- a practical part (answers to questions concerning botany, zoology, general biology and two elective subjects).

The author also describes in detail the organizational regulations of the Biology Olympiad, especially how answers are assessed and how the jury functions.

421. BERKINBILT, M.B. - LAPIN, V.I. - ZAYKIN, Y.V.: Analiz otvetov shkolnikov na voprosi biologicheskoy olimpiadi MGU (An analysis of the answers given by pupils in the Biology Olympiad)
Biologiya v shkole, 55, 1981, No. 3, pp. 48-53.

An analysis of answers given by pupils during Biology Olympiads was undertaken by students of the Moscow State University; the analysis makes it possible to assess the quality of pupils´ knowledge and their interest in various biology problems. The answers analysed were given by pupils from the 7th to 9th classes. Similar analyses of answers by pupils from the 8th and 10th classes can be found in No. 4, pp. 70-75 and of pupils from the 7th, 9th and 10th classes in No. 6, pp. 67-74 of this journal.

422. BLAGOSKLONOV, K.N. - BAGOTSKIY, S.V.: Biologicheskiye olimpiady shkolnikov (Biological Olympiads for pupils)
Biologiya v shkole, 55, 1981, No. 2, pp. 62-64.

The authors sum up some of the experiences gained in organizing a Biology Olympiad for pupils of the 6th to 10th classes and concerns the years 1979 to 1981.

423. SOKOLOVA, R.P. - KOSTINSKAYA, I.I.: Raboti NOU po biologii (The activities of Pupil Scientific Societies in biology)
Biologiya v shkole, 55, 1981, No. 1, pp. 59-62.

A new form of activity has made its appearance in schools among pupils of the 8th to 10th classes: Pupil Scientific Societies. The outcome of these activities are concentrated in the House of Young Natural Scientists and Technicians in Moscow where they come from Young Pioneer Houses in various towns, cities and regions. The work concerns various areas of biology, some has the form of surveys, while other work is devoted to the outcome of experiments. The authors stress a lack of unity in this work and the fact that there is a lack of precision in the title pages of the work submitted. All submitted work should also be accompanied by an assessment. In conclusion the authors provide a survey of the various topics dealt with in various part of the USSR.

424. XII olympiada biologiczna. Pod haslem Gleba i źycie w roku szkolnym 1982/83 (The 12th Biology Olympiad, with the motto "The Soil and Life", in the school year 1982/83)
Biologia w szkole, 34, 1981, No. 5, pp. 311-313.

The Ministry of Education, The Committee for Biological Olympiads, the N. Copernicus Natural Science Society Institute, and the Nature Conservation League Administration have announced the subject-matter and program of the 12th Biology Olympiad, which will be held from January 4th, 1982 until November 6th, 1982. The first round will last from January 4th until April 30th, 1982, the second round from May 1st to November 6th, 1982. The finals will be held from November 3rd to 6th,

1982. The subject-matter of this year's Olympiad is "The Soil and Life" (the soil as the source of life and the source of food). The IInd level of the competition will be held from November 8th, 1982 until January 1983, with district competitions held from January 29th to 31st, 1982, where the subject-matter will pertain to biology as a science as it is reflected in the school teaching syllabi and specifically with nature and environmental concervation from the point of view of the soil.
The IIIrd level of the competition will be held from February 1st to April 11th, 1983, and the national Polish finals will be held on April 9th to 11th, 1983. At this stage the whole biology curriculum must be mastered, including problems of nature and environmental conservation from the point of view of the importance of the soil in the environment. The journal also reprints instructions to teachers and participants in the competition.

11.8 Field work and summer natural science activities, scientific trails

425. KOZHUKHAROV, S.: Biologichniyat monitoring - novo priloshno napravlenie v ekologiyata (Biological monitoring - a new trend in ecology)
Biologiya i khimiya, 24, 1981, No. 4, pp. 1-6

The word "monitoring" is of English origin and appeared at the beginning of the seventies for indicating a system of studying individual elements in the natural environment in time and in a specific area according to a precise and predetermined program. The author describes the monitoring of various specie of fauna and flora in threatened areas of Bulgaria and the voluntary aid of young nature lovers in monitoring research stations.

12. Planning biology instruction

426. BÖHMER, E.: *Zum aktuellen Thema* (Concerning a current topic)
Biologie in der Schule, 30, 1981, No. 1, p. 28

The author expresses her opinions on changes about to be implemented in biology instruction in the 8th class. She describes her own experiences with instruction and advocates alloting a larger number of lessons to the subject-matter of the biological essence of man and his position in the system of organisms.

427. GAGAT, S.: *Project rozkładu materiału* (A project to divide teaching subject-matter into lessons)
Biologia w szkole, 34, 1981, No. 4, pp. 241-243.

The author provides a detailed division of the subject-matter of biology instruction in the 8th class of general education schools. She cites the number of the topic for each lesson, its content, the method of instruction, didactical media used and a bibliography for the teacher´s preparations for the lesson.

428. IGNATOWSKA, J. - LOŚ, A.: Project rozkładu materiału dla klasy II LO o profilu klasycznym (A project for dividing the subject-matter for teaching in the 2nd class of a general education secondary school with a classical specialization)
Biologia w szkole, 34, 1981, No. 4, pp. 244-246.

In the 2nd class of general education secondary school with a classical specialization the biology subject-matter to be taught is divided in the following manner: Introduction (1 lesson), The cell (4 lessons), The development and multiplication of plants (15 lessons), The variability of invertebrates (12 lesson), The natural system as the outcome of the variability of the plant and animal worlds (8 lessons). The author goes on to divide in detail these topics into individual lessons and cites the teaching media needed.

429. IGNATOWSKA, J. - LOŚ, A.: Projekt rozkładu materiału dla klasy III LO (A project for dividing the subject-matter for teaching in the 3rd class of a general education secondary school with a mathematical specialization)
Biologia w szkole, 34, 1981, No. 4, pp. 247-250.

In the 3rd class of general education secondary school with a mathematical specialization the biology subject-matter is divided into the following units: Introduction (1 lesson), Basic development stages of chordata (17 lessons), Selected problems of plant and animal physiology (16 lessons), The distribution of flora and fauna on Earth (1 lesson), Selected problems of ecology and nature conservation (5 lessons).

430. MORGENSTERN, G.: Zum aktuellen Thema (Concerning a current topic)
Biologie in der Schule, 30, 1981, No. 1, pp. 25-28. 1 fig.

The author offers comments on the supplementary material for biology instruction in the 8th class which is about to be published. She confronts her own experiences with the concept of the changes in biology instruction and concentrats on problems connected with gas metabolism in respiration and explaining the relation between metabolic processes and biological oxidation. Also the problem of whether the new concept provides sufficient opportunities for motivation is discussed.

431. ROHDE, C.: Variante zum Stoffverteilungsplan Genetik - erfolgreich erprobt (A successfully tested version of the teaching syllabus for genetics)
Biologie in der Schule, 30, 1981, No. 12, p. 526.

The author seeks improved motivation for her pupils, as well as the historical process of cognition. To achieve these ends she uses from the very beginning TV programs (for instance in such topics as mitosis and meiosis). She appeals to readers to describe how they make use of TV programs and how they incorporate them into genetics instruction.

432. SCHIFFER, H.: Zum Beitrag "Proteinsynthese - einmal anders" kritisch beurteilt (Critical comments concerning the article "Protein synthesis - this time differently")

The author makes critical comments concerning the article cited in the title, written by Mrs Hunneshagen and printed in No. 7/8 of this journal. Even if the author of this comment is not against an amusing manner of presentation of difficult parts of the teaching syllabus, in his opinion the article in question simplifies too much the process of protein synthesis and is not factually correct. Moreover, the picture accompanying the article does not express the dynamics of protein synthesis.

433. WULKE, H.: "Proteinsynthese - einmal anders" kritisch beurteilt (Critical comments concerning the article "Protein synthesis - this time differently") Biologie in der Schule, 30, 1981, No. 9, p. 385.

The author offers critical comments on an article cited in the title and published in No. 7/8 of this journal (p. 335). Terms used in the article, such as translation and codon are not cited in the syllabus. On the basis of an analysis of pupils' opinions concerning the article, other critical comments are made.

12.2 Preparing teachers for instruction, for teaching lessons, and other organizational forms of biology instruction

434. BIELOHLAWEK-HÜBEL, G.: Wald schützt vor Lärm (The forest protects against noise) Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 2, pp. 56-58. 2 figs., 1 tab.

The topic "noise" is an important topic in education towards environmental conservation. The author points to opportunities for dealing with this topic in school instruction. The subject has an interdisciplinary aspect. Pupils should learn about the negative aspects of noise, opportunities for decreasing noise and how noise intensity can be measured in the environment. The latter is described on the basis of an instrument (produced by the firm MAUER). During an excursion, noise can be measured on a highway and then at various distances from it. The noise level is much lower when the terrain is covered with trees.

435. CICHY, D.: Projekt rozkładu materiału nauczania biologii dla klasy V. (A project to divide biology teaching subject-matter into lessons in the 5th class)
Biologia w szkole, 34, 1981, No. 4, pp. 213-217.

The author divides the subject-matter for biology teaching in the 5th class into a total of 80 teaching lessons which include also lessons for repetition, etc. The plan includes the number of the lesson, its topic, what the lesson is composed of, its course, the methods used and the media recommended.

436. DANNEEL, I.: Der Baggersee. Einführung in das Unterrichtsthema (A dredged lake. An introduction to a teaching unit)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 3, pp. 345-347. 4 figs.

A dredged out lake is a suitable topic for various types of schools and different age groups. This article provides motivation and an introduction to such a teaching topic. It describes the development of small artificial water reservoirs which are made by dredging gravel, river sand, peat, lignite or limestone. In the introduction the author acquaints readers with the basic factors which influence the development of these formations, as well as a typology of stagnant waters, how they are populated, their depth, the substances which are dissolved in such waters, oligotrophic and eutrophic water reservoirs, their ecological conditions, the circulation of matter and energy flows, etc. This article is followed by a series of others which deal with special aspects of artificial lakes.

437. DANNEEL, I.: Der eutrophe See (An eutrophic lake) Naturwissenschaften im Unterricht, 29, 1981, No. 10, pp. 375-389. 2 worksheets, 2 summary sheets, 3 tabs., 1 fig.

The author suggests devoting 10 lessons to this topic. It deals primarily with the adaptation of plants and animals to a new environment provided by an artificial lake when it is being populated. The author stresses the causes of eutrophisation and acquaints the reader with the plants and animals found in this environment with the help of comparative and identification tables. On the basis of this material the pupils are able to undertake independent assignments for field work and for processing the material they collected in the laboratory. This topic assumes an excursion to an eutrophic lake (i.e. a fish pond with fish in it, a fish pond intended for bathing or a dredged recultivated lake). The tables provide pupils with information concerning the development of water from oligotrophic to entrophic states, the populating of an artificial lake with shore and floating plants, with fresh water plankton, with animals living in the lake, with birds, fish, insects and molluscs. The sequence of lessons is the following: 1) the importance of such lakes, their environment, the summer distribution of temperature; 2) definitions of different types of lakes, their population and eutrophisation; 3) how oxygen penetrates such lakes, the planning and carrying out of an excursion; 4) and 5) processing the material collected during the excursion; 6) and 7) the problems of plant and animal adaptation to new conditions of life, 8) the shellfish Anodonta cygnea; 9) food chains and energy flows in an artificial lake; 10) landscaping the lake.

438. HERHAUS, K.F.: Die natürliche Besiedlung des Baggersees (The natural populating of dredged lakes) Naturwissenschaften im Unterricht - Biologie, 20, 1981, No. 10, pp. 348-375. 7 figs., 7 models for transparencies, 5 tabs.

Dredged lakes, if left to themselves for longer period of time, will become populated with various plants and animals. In this way the artificial lake becomes a new community, which is subject to the laws of development which make it almost into a natural living fresh water community. Pits which are the outcome of quarrying sand, gravel, lignite, peat or limestone are usually flooded by underground water and their water level then depends upon rainfall. Such lakes do not have an inflow or through-flow of water or water currents. They are enclosed and permanently stagnant. At first such lakes are among secondary oligrotrophic waters, which have very few nutrients. But gradually, due to the washing of nutrients into the water from the surrounding land, these waters become eutrophic. The author describes in detail a dredged lake, describes its area and depth (the pelagic layer, the Benthos, Pleuston, Euphotic zone, Aphotic zone, the Eulittoral zone, the Infra--littoral zone, the profundal and phytal areas). He then describes communities found in various parts of artificial lakes. The author also provides suggestions for independent assignments for pupils, which can be carried out during an excursion to an artificial lake.

439. HOFER, K.: Der Winter - die lebensfeindliche Jahreszeit (Winter - a season dangerous to life) Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 9, pp. 289-297. 4 figs., 2 worksheets, 2 tabs.

The author recommends devoting 2 teaching lessons to the topic cited in the title of the article. The subject can be divided into two parts: "Winter as a dangerous period for life outside the tropics" and "Abiotic factors in the winter environment". These lessons first recall knowledge from astronomy - the path of the Earth around the Sun, the position of the Earth's axis during its orbit, which influences various periodic phenomena on Earth, especially in the temperate zones of the Northern hemisphere with alternation of seasons. Annual changes in abiotic factors of the environment influence biotic factors. Attention should be paid to Kepler's laws, changes in the Earth's axis, the angle of the sun's rays, the length of days and nights, costal climate and continental climate, changes in radiation, the quantity of snow and ice and the temperature of the soil, which all influence the conditions for the life of plants and animals in the winter.

440. JÄGER, R.: Baggern und Rekultivieren (Dredging and recultivation).
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 10, pp. 390-408. 2 worksheets, 7 information sheets, 8 figs., 1 tab.

The author recommends using 15 teaching lessons for dealing with the problem of dredging and recultivation. This topic is designed as an introduction for pupils which aims at acquainting them with environmental conservation. It deals with the recultivation of artificial lakes formed by quarrying lignite, sand, gravel, peat or limestone. Since problems concerned with recultivation are not too well known, the lessons are mostly taken up with new information. First the pupils are acquainted with the forming of artificial lakes, their development in the landscape and the opportunities for their utilization. The 1st lesson is devoted to an introduction and a description of how a dredged lake develops; the 2nd and 3rd lessons are devoted to excursions and the collection of material, the 4th lesson to preparing various papers, the 5th and 6th lessons to statistical assessments and graphical representations, the 7th lesson to the recreational use of these lakes, the 8th and 9th lessons to dealing with press items, the 10th lesson to general considerations concerning plans for the recultivation of artificial lakes, the 11th to 14th lessons for group work and the 15th lesson to a discussion of the Sechseen-Platte Duisburg-Wedau model.

441. RIESS, W.: Begriffsverständnis in der Ökologie
(An understanding of ecological terms)
Praxis der Naturwissenschaften - Biologie, 30, 1981,
No. 7, pp. 193-199. 6 figs.

The author discusses basic ecological terms from the point of view of school needs and makes it easier to explain them in the course of instruction. This concerns above all the following terms: autoecology, abiotic factors, valency, potency, habitat, monota, demota, biota, trophic factors, phytophage, zoophage, parasitism, symbiosis, synecology, biocoenoses, biome, eco--system, bio-sphere, diversity, stability, energy circulation and circulation of matter in nature. The article is accompanied by a diagram of mutual ecological relations between plants, animals and man and a table which shows a sequence of basic ecological terms in relation to living organisms and their environment.

Living organisms	Living environment
individual	monota
population	demota
bioceenoses	biota
biome	bioregion
bio-sphere	toposphere

442. RODZIK, H.: Projekt dydaktycznego opracowania działu ochrona i kształcowanie środowiska w kl. IV. (A project to develop the teaching unit concerning environmental conservation in the 4th class) Biologia w szkole, 34, 1981, No. 2, pp. 86-94. 4 figs., 3 tabs., 1 crossword puzzle.

The author describes her own development of the topic cited in the title for teaching in the 4th class and its division into 5 lessons, which deal with the following topics: The dependency of man on nature, How man changes the environment, Renewable and non-renewable natural resources, How to utilize natural resources in a rational way, Repetition and summary concerning environmental conservation. Individual teaching lessons are describes in detail, as well as their teaching and educational objectives, the skills to be learnt, problem situations to develop, teaching methods used, organizational forms of teaching, cooperation among pupils, teaching media, the course of the lesson and its summary.

443. SCHOLZ, E.F.: Der Klassenpapierkorb - ein Forschungsfeld für Schüler und eine Aufforderung zur Verhaltensänderung (The class waste paper basket - a area for pupils' research and a pledge to change behaviour) Naturwissenschaften im Unterricht - Biologie, 20, 1981, No. 1, pp. 23-29. 1 tab., 3 worksheets, 1 fig.

On the basis of examining the content of the class waste paper basket, the general problem of waste can be discussed. But at the same time very serious educational problems will crop up concerning the fact that many pupils throw away good quality food (bread, butter, cheese, sausage, ham); this indicates a lack of respect for the work of parents, farmers, the food processing industry, etc. In this context the world-wide shortage of food can be discussed and the fact that children in the Third World suffer from hunger and malnutrition. Pupils should bring to school only as much food as they are able to eat. Also the problem of waste paper should be discussed, its price, output and the fact that it is often wasted, as well as the importance of collecting scrap paper. The burning of waste poses a threat to the environment. In the FRG each citizen produces a total of 300 kg of waste annually and in 1978 it was necessary to deal with 166 million tons of waste; of this number 18 million tons was household waste. Endeavours for re-cycling, i.e. returning substances found in waste to industrial processing - are very important. This topic can be used from the 5th class onward.

444. TENDEL, J.: Überwintern von Pflanze, Tier und Mensch. Zum Konzept des Themenheftes (The wintering of plants, animals and man. A concept for a teaching topic)
Naturwissenschaften im Unterricht - Biologie, 20, 1981, No. 9, pp. 285-289. 1 fig., 3 surveys.

The introductory article to a mono-thematic issue of this journal is devoted to the wintering of plants, animals and man and deals with general problems of organism strategy in wintering. This topic is developed into 7 teaching lessons whose main purpose is to demonstrate sources of energy and methods of energy conservation. Thus it deals not only with purely biological problems, but also with those interdisciplinary problems which have a bearing on geography, physics and technology. On the basis of becoming acquainted with abiotic factors in the environment, which are the cause of low temperatures, their influence on organisms and the reaction of the organism to this decline in temperature can be studied.

445. WELLS, R.V.: Invasion Ecology and School Biology - Part II.
The School Science Review, 62, 1981, No. 221, pp. 667-674. 37 lit.

Over 90 schools throughout the United Kingdom are participating in mapping the incidence of plants and thus contributing to an Atlas of British Flora. School teachers, professional botanists, as well as school pupils and amateurs are all making their contribution. Invasion ecology is becoming a new field of study, which makes a contribution to evolution theory, genetics, ecology and economic biology, as well as nature conservation and the history of biology. In studying invasion plants it was found that the dead nettle (Lamium album) is an old invasion plant which originated probably in the Caucasus. Also a number of species of speedwell (Veronica), especially the Persian speedwell, are invasion plants, as well as Impatiens glanduliere which originated in the Himalayan mountains and the Evening primrose (Oenothera). Among aquatic plants the waterweed Anacharis canadensis, as well as many of the water lilies (Limnanthemum peltoides) are invasive. Crassula helmsii comes from Australia. Among the non-flowering invasive plants a number of Bryophyta, such as Campylopus introfelxus and Orthodontium lineare are cited. Among the algae, Laminaria ochroleuca and Colpomenia peregrina are mentioned, among the red algae Gratelpupa, among the kelps Saragassum muticum, which is one of the most dangerous invasive plants of recent times. Among invertebrates two Anthozoa have been discovered (Cornularia cornnucopiae and Aiptasiogeton comatus). Among other invertebrates the crustacean Orchestia cavimana has recently been discovered, as well as the mollusc Potamopyrgus jenkinsi. Crangomys pseudogracilis was brought to England with acquarium plants. Together with the shrub Rhododendron ponticum from northern Europe and the Near East, 4 species of insects were brought into the country, of which Gnaphocephala coccinea is a carrier of fungal disease. Among vertebrates, 14 species of fresh water fish have been domesticated in Britain, among amphibians the frog Rana ridibunda has successfully invaded Britain, as well as several specie of birds (the shearwater and one type of pigeon). Among mammals the kangareo Macropus rufogriseus from Tasmania lives wildly on the Isle of Wight. Schools in Portsmouth have discovered Sargassum muticum, Mercenaria mercenaria, Styela cava and Styela mammiculata on the southern coast of England.

12.21 Preparations for botany instruction

446. BEISENHERZ, W.: Das Kohlendioxidproblem als Thema des fächerübergreifenden Biologieunterrichts (The problem of carbon dioxide as a topic in biology instruction)
Der mathematische und naturwissenschaftliche Unterricht, 34, 1982, No. 7, pp. 423-428. 3 figs., 3 tabs., lit. 20.

Problems concerning carbon dioxide can clarify a number of topics in biology instruction, including those of environmental conservation and protecting the whole biosphere of the Earth. It also requires an interdisciplinary approach where biology deals with chemical, physical and geographical (climatological) problems, as well as those dealt with in civics. The carbon dioxide content in the Earth's atmosphere continues to grow, especially as a consequence of burning fossil fuels and the large-scale felling of timber in the tropical rain forests. Science is not yet able to precisely anticipate the consequences of these activities on the part of the human race, but many scientists have expressed anxieties concerning the increasing amount of carbon dioxide in the atmosphere, on the basis of facts concerning previous geological eras and some serious symptoms already apparent at present. The author discusses the problem in detail from the point of view of teaching in the upper classes of secondary school. His analysis is accompanied by data summarised in 3 tables and he also provides instructions for carrying out several experiments, which are easy to do and document the problems of photosynthesis and carbon dioxide. The tables also contain a survey of sources of carbon dioxide and plant communities found on Earth and their primary production of carbon, in billions of tons annually, etc.

447. BOLAY, E.: Die Würgerfeige (Ficus benjamina L.) als Beispiel für eine Unterrichtseinheit zum Thema Epiphytismus und Parasitismus (The rubber plant Ficus benjamina L. as an example for a teaching unit dealing with epiphytic plants and parasitism)
Naturwissenschaften im Unterricht, 29, 1981, No. 8, pp. 272-280, 3 worksheets.

The well-known indoor rubber plant (Ficus benjamina L.) is a suitable object for activating pupils and their independent work. Its evolution and ecology should first be studied (it belongs to the family Moraceae) and the genus Ficus includes approximately 1000 species found in the tropics and sub-tropics. The author describes how to acquire a plant and care for it and how to make use of the plant material. With the help of various information and worksheets pupils become thoroughly acquainted with the plant. In practical work, observations can be carried out with the naked eye, or with a magnifying glass or a microscope. During this work pupils learn basic ecological terms, such as epiphytism, parasitism, an epiphyt, parasite, symbiosis. Also the morphology and anatomy of the plant and its ecology should be studied. The most interesting is the ecology of its flowers and fruit. The author tested this teaching of the topic in the 8th class in a biology practical excercise. The topic can also be used in the 11th class in the ecology course. In the practfcal excercise, the plant is used to study its hard multiple fruit case, the soft pulp of the multiple fruit, its small hard seeds, the parenchyma tissue of the multiple fruit pulp, its clusters of calcium oxalate, stomata, idioblasts etc. If nothing else is available the fruits of Ficus carica L. can also be used.

448. BRUNNER, U.: Faser- und Ölpflanzen im Unterricht: Der Flachs (Linumusitatissimum L.) (Textile and oil-bearing plants in instruction: Flax (Linum usitatissimum) Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 3, pp. 77-88. 27 figs.

The author demonstrates how to deal with a plant which is both the representative of textile and oil-bearing plants - flax (Linum usitatissimum L.). In a a period of accelerated technical development and agricultural production, people often tend to underestimate the importance of this plant for mankind. In botany teaching pupils should become acquainted with the morphology, anatomy, microbiology, genetics and ecology of this plant. They learn the biology of flax, the structure of its stem, fibre, flower and seed, how the oil and fibre are produced, its cultivation and harvesting, as well as industrial processing. The author recommends various experiments and observations and also cultivating some flax on a school plot of land. The harvest of the crop can then be used to obtain some oil, study its properties and to obtain fibres from the stem, demonstrate the presence of cellulose, how it disintegrates and the spinning and weaving of linen. This subject-matter provides ample opportunities for pupils' independent research projects, observations and experiments.

449. DOMKA, L.: Czynniki warunkujące proces fotosyntezy (Factors causing photosynthesis) Biologia w szkole, 34, 1981, No. 2, pp. 111-114. 3 figs.

Photosynthesis of green plants is taught in biology, but in an inadequate manner, so that pupils do not quite comprehend correctly this basic and most important physiological phenomenon in plants. Usually the fact that the products of photosynthesis make their way to the roots, bulbs, tubers or seeds for storage is stressed, but not the fact that this is also true of the leaves. The production of sucrose in the leaves and its transmission into other organs is usually not explained. The article therefore demonstrates the opportunities for dealing with the factors which cause photosynthesis. The author recommends a total of 4 lessons for this topic during which 2 experiments to demonstrate the need of light for photosynthesis and 2 experiments to demonstrate the need for carbon dioxide, as well as 1 experiment to demonstrate the need for water are done. 1 experiment should also be devoted to demonstrating the need for chlorophyll. Thus a total of 6 very good experiments are described.

450. EINHELLIG, J.: Ungewöhnliche Verwendungsmöglichkeiten von Pflanzen. Eine Unterrichtseinheit für das 7. und 8. Schuljahr (An exceptional opportunity to use plants. A teaching unit for the 7th and 8th classes). Naturwissenschaften im Unterricht - Biologie , 20, 1981, No. 7, pp. 227-236. 6 figs.

The author suggests a teaching topic for the 6th class taught during a total of 16 teaching lessons which will make use of wildly growing plants. He stresses contemporary trends away from the use of chemicals, synthetics and various preservatives and artificial substances in the food processing industry, cosmetics and pharmacology and the wide-spread use of plants as spices and colouring agents. The topic was experimentaly taught at an integrated basic school in Göttingen-Geismar in the course of three weeks. Group work by pupils was used extensively. The plan for dealing with this topic included the making of a cough sirup from the roots of Althaea officinalis, toilette water from lavander flowers (Levandula officinalis), a salad from the leaves of Taraxacum officinale and golden-yellow coloured dye for dying natural wool made of the leaves of Betula verrucosa. Also a recipe for making estragon vinigar is provided. The assignments are intended for individual groups of pupils and the course of each lesson is described.

451. ELIÁŠ, P.: *Ekologické hladiska vo vyučování botaniky na základnej škole* (Ecological aspects in botany instruction in basic school)
Přírodní vědy ve škole, 32, 1980/1981, No. 4, pp. 122-125.

It is no longer possible to use up natural resources carelessly. Attention should be devoted to the education of people towards environmental conservation. Socialist schools have a special role to play in this context. Practically, this means that knowledge in ecology and the implementation of ecological aspects must be made maximum use of in the course of teaching botany in basic school. The concept of the new teaching syllabus for biology in the 5th class of basic school should, in this context, fulfill the following specific tasks:
1. achieve an understanding of the dialectical unity between the organism and the environment;
2. explain the relations between structure and function at the plant level and partially also at the level of the plant community;
3. stress the exceptional status of plants for life on our planet;
4. educate pupils towards environmental and nature conservation and especially the conservation of individual plants and plant life in general;

5. achieve an understanding of equilibrium under natural conditions and acquaint pupils with the consequences of a loss of this equilibrium.

The author provides specific recommendations for including ecological knowledge into various teaching lessons.

352. FICÓN, D.: Budowa i rozmnaźanie droźdy (The structure and multiplication of yeast)
Biologia w szkole, 34, 1981, No. 5, pp. 304-306.
1 diagram.

The author provides an outline of a teaching lesson concerning the variability of fungi and mushrooms. Attention is devoted to fungi and their environment, structure and requirements. The purpose of the article however, is to acquaint the reader with the structure and life of unicellular yeast, which in this case represents unicellular fungi. Such terms as unicellular fungi, cellular walls, cytoplasmatic membrane, cytoplasma, nucleus and vacuoles are explained. Pupils train their skills in carrying out various observations, mount and stain various microscopical specimens, use a microscope and laboratory instruments, observe unicellular organisms and learn to interpret what has been observed, to draw what has been observed and to make conclusions. The educational objective is to strengthen a materialistic worldview and to discover the material causes of various phenomena. The method used is based on observations and experiments, the didactical aids used include a microscope with various additional items used with it and permanent, as well as fresh mounted specimens. During the preparatory stage pupils recall what they know about fungi and molds, how they live, their reproduction, the damage they do, as well as the positive role they have in nature and for humans. The new subject-matter deals with a yeast culture, which will be used for the observations and experiments. The subject-matter of the unit is called The Structure and Multiplication of Yeast, and is based on independent microscopical observations and a repetition of the rules of microscopy. The specimens should be observed 10 x and 40 times magified; then a drop of Lugol solution is added and comparisons are made between what is seen under the microscope and the pictures printed in the textbook. Pupils describe the structure of a yeast cell and write their observations into notebooks. They then concentrate their attention on the division of yeast cells. For homework, pupils write about where yeast cells can be found and how they reproduce. In the final stage, knowledge is summed up, made more systematic and integrated. Generalizations are carried out and the individual work of pupils is assesed; each pupil is also asked for an evaluation of his own work and the work of the group.

453. JUŚKIEWICZ, B.: Realizacja hasła programowego ochrona przyrody (Implementing the main motto of the nature conservation teaching syllabus).
Biologia w szkole, 34, 1981, No. 1, pp. 35-41. 2 tabs.

The author provides an outline for a lesson in the 5th class concerning the purpose and significance of outdoor greenery. The objective of the lesson is to form the notion of urban and village greenery, to stress the health, aestherical and economic significance of greenery and to educate appropriate attitudes among pupils towards greenery which would effectively prevent them from destroying greenery when they encounter it. The lesson should make include discussions with elements of problem teaching and should make use of the journal Przyroda Polska. The author has also prepared an outline of another lesson in the 6th class, where also problems concerning the relation between man and the environment are dealt with. Also problems concerned with the conservation of natural resources are dealt with, as well as the causes of water and air pollution and methods of overcoming them, and the importance of national parks and nature reservations. Another outline for a lesson in the 6th class concerns the conservation of various specific plant species.

454. KLAMM, G.: Herbstfärbung, Laubfall and Abbau des Fallaubes. Projektarbeit für das 6. Schuljahr
(Autumn colouring, the falling of leaves and the decay of fallen leaves. A project for teaching in the 6th class)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 11, pp. 409-421. 8 figs., 4 worksheets, 2 designs for transparencies, 1 test.

The teaching unit dealt with by the author concerns the autumn colouring of leaves, the falling of leaves and their decay; these problems are given to pupils as assignments for special project work. The stress is on independent observations and descriptions by pupils of interesting biological phenomena. The pupils thus also have the opportunity to train instrumental skills. In dealing with individual problems, also the wider context of ecological problems should be kept in mind. The pupils first become acquainted with the most frequently encountered deciduous trees, they learn to identify them according to the shape of their leaves and their edges and why trees shed their leaves as protection against loss of water in the autumn and winter. Pupils also become acquainted with the fact that trees accumulate nutritions substances in the underground organs of the tree, in the trunk and buds and with the function of cork layers on the sheath of the petiole. They become acquainted with animals living in the soil who contribute to the disintegration of fallen leaves and the creation of new soil. Pupils also collect, press and identify leaves, draw them and carry out various experiments. In conclusion the pupils can arrange an exhibition on this subject.

455. KONONOVA, S.D.: Metodika izucheniya biogeocenoza lesa v fakultativnom kurse "Vvedeniye v ekologiyu"
(The methodology of teaching about the bio-geocoenoses of the forest in the elective course "An Introduction to Ecology")
Biologiya v shkole, 55, 1981, No. 1, pp. 45-51.

The teaching syllabus devotes 3 teaching lessons to the topic The forest and 4 lessons for practical work (an excursion) on this subject. The author recommends the following division of the subject-matter:
1. The significance of the forest in nature and for the national economy - show pupils the importance of the forest as one of the most valuable natural resources; - show pupils the importance of forests for life on Earth and the aesthetical significance of the forest.
2. The specie variability of forest organisms, their adaptation to mutual co-existence and the conditions provided by the environment - demonstrate the effect of abiotic factors in relation to the specie variability of organisms - demonstrate the ecological adaptation of forest fauna.

3. Measures for the conservation and renewal of the forest - demonstrate the influence of anthropogenic factors in the forest - acquaint pupils with the comprehensive measures being taken for forestry conservation; - point out the role of pupils in forestry conservation.

4. Practical excercises (2 lessons) for finding, identifying and counting insect pests in a garden (park or forest).

5. An excursion to a winter forest (park, garden) with the aim of studying the ecological adaptation of flora and fauna - teaching pupils skills in determining the composition of flora in the wintertime - learning skills for identifying fauna on the basis of various clues - a study and analysis of the adaptation of forest fauna to winter conditions - discussion concerning opportunities for helping animals in the winter.

456. LANGE, S.: Erfahrungen zur Behandlung der Aziditätsverträglichkeit der Pflanzen im Fach Biologie Klasse (Experiences with studying the resistance of plants towards acidity in biology teaching in the 9th class)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 81-82.

The methodological handbook is here criticized by the author for its approach to the topic "The reaction of the soil as one of the factors in forming the environment of a plant". In his opinion the most important problem which the lesson should deal with is the mutual ratio which exists between the following: colloids in the soil - salt cations - pH - the plant organism. Pupils should learn that the soil contains colloids, particles with a negative charge, which bind salt cations (for instance Mg^{2+}, HN_4^+ etc.) and which prevent its flooding out, but at the same time make it more difficult for the plant to assimilate them. The plant receives salt cations bound to colloids in exchange for hydrogen ions, which are the outcome of a reaction between carbon dioxide and water. From this it also follows that the pH value of the soil is very important for the plant. This will make it easier for pupils to understand why some soils must be neutralized, drained and fertilized.

457. MASCHKE, J.: Auch Pflanzen atmen Sauerstoff ein und Kohlendioxid aus (Plants also inhale oxygen and exhale carbon dioxide)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 6, pp. 182-190. 3 figs., 2 worksheets, 1 model.

The author provides the outline for four teaching lessons devoted to plant physiology, concerning the exhalation of carbon dioxide and inhalation of oxygen by plants, for use in the intermediate classes of secondary school. The pupils during these lessons undertake independent experiments with plants which should prove the exhalation of carbon dioxide. During these experiments the pupils determine that green plants are producers of organic substances which they form, with the aid of solar energy, from mineral substances, water and carbon dioxide. They also determine the circulation of oxygen and carbon. Respiration is defined as the general intake of oxygen and output of carbon dioxide. By respiration the assimilate which is formed disintegrates into carbon dioxide and water, while setting free energy. Hence respiration leads to the freeing of energy which is needed for instance for the biological oxidation of substances rich in energy into plants and anamial substances. In plants the process of photosynthesis takes place at the same time as respiration (in green plants), so that respiration is difficult to prove. A plant carries on respiration not only during the daytime, but also at night. During the day the process of photosynthesis predominates. In the dark and in non-green parts of plants, the presence of cellular respiration can be demonstrated, as well as the output of energy. Besides sucrose, plants also exhale other substances in respiration, such as fats and proteins. The intensity of respiration differs; it is tiny in dry seeds of plants, more intensive in growth processes, during the germination of seeds, when the plant is wounded or irritated, and when respiration and the freeing of energy grow in leaps. Permanent tissue shows the same intensive weak respiration (leaves) which essentially is sufficient to maintain life functions. The energy gained by respiration is for the larger part again freed as thermal energy. Freed energy can be well demonstrated, for instance in germinating seeds of peas, where the temperature rises. In some shrubs which do not have chlorophyll, respiration frees so much energy that the temperature of the blooms exceeds the temperature of the environment by as much as 10°C. During the storage of plant substance also sharp rises in temperature can occur, for instance in haystacks, where self-ignition can take place. The author divides up the subject-matter into 4 lessons; while people and animals exhale used-up air, plants exhale carbon dioxide, pea seeds produce heat, all living organisms inhale oxygen and exhale carbon dioxide.

458. NOZHAROVA, L.: Draznimost i dvizhenie pro organizmite (The stimulation and movement of organisms)
Biologiya i khimiya, 24, 1980, No. 4, pp. 7-14.

The topic of stimulation and movement in the 10th class is divided into five teaching lessons:

1) Reaction to stimulation as the main characteristic of organisms;
2) Reacktion to stimulation and the movement of organisms without a nervous system;
3) Manifestations of reaction to stimulation in multi--cellular organisms;
4) Reaction to stimulation and the movement of organisms with nervous systems;
5) The bio-physical and bio-chemical essence of nerve stimulation.

The author explains the methodological approaches which should be taken to this topic and cites various problem assignments and the use of survey tables and diagrams which make it possible for pupils to understand changes in electrical potential in the membranes of nerve fibres.

459. OBERHARDT, E.: Vorschläge zur Gestaltung der 11. Stunde der Stoffeinheit "Bau und Stoffwechsel der Sprosspflanzen" Klasse 9 (Topics for dealing with the 11th lesson in the teaching unit "The structure and basal metabolism of higher plants" in the 9th class)
Biologie in der Schule, 30, 1981, No. 5, pp. 201-206.

For biology instruction in the 9th class a new textbook is available, as well as a methodological handbook. The latter devotes a total of 10 topics to "The structure and basal metabolism of the higher plants". The 11th lesson is devoted to extending and repeating the subject-matter. In this context the author submits two different approaches for the purpose of discussion. Both alternative descriptions of the lessons include the activities of pupils and the teacher.

460. SCHIEFER, H.: Erfahrungen zur Behandlung des Generationswechsels der Samenpflanzen nach dem überarbeiteten Lehrplan Klasse 11 (Experiences with teaching the alternation of generations of spermatophyta according to the changed biology syllabus for the 11th class)
Biologie in der Schule, 30, 1981, No. 9, pp. 374-375.

The implementation of the new teaching syllabus requires that teaching objectives be properly thought out. When teaching systematics, the problem of the alternation of generations is also included; this topic is rather difficult to understand in view of its abstract nature. The author suggest dividing the subject-matter into four parts which he describes in detail, and discusses various methodological aspects.

461. SCHWARZ, E.: Isolierte Bohnenembryonen. Anregungen für den biologischen Anfangsunterricht in der Sekundarstufe I. (Isolated bean embryos. Suggestions for biology instruction for beginners in the lower classes of secondary school)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 11, pp. 429-431. 5 figs.

The author describes the use of isolated bean embryos in biology instruction for beginners in the lower classes of secondary school. The use of an isolated embryo has a number of advantages in comparison to classical procedures with germinating seeds. Pupils obtain for observation a bean embryo in its natural form so that they can observe its early growth and development stages on a single specimen, which can also be measured systematically. All pupils can carry out the work, which requires only very inexpensive material and instruments. For removing the seed coat from a dry bean, the author recommends the use of a nail file, which is used to file the seed coat and is safe to use. It can then be peeled of with a thumbrail. One of the cotyledons is then pulled away until it breaks of and with a sharp needle the second cotyledon is separated. The embryo is then placed on damp filtration paper into a Petri dish. Under natural conditions (i.e. the alternation of light and darkness) after 4 to 7 days the embryo begins to become green, its roots begin to grow, as well as its first leaves. The embryo is then made to grow without both cotyledons with their stock of nutritious substances.

462. STATKEVISH, N.V.:K izuchenii temi "Osnovniye gruppi rasteniy" (Concerning the teaching of the topic "Basic groups of plants")
Biologiya v shkole, 55, 1981, No. 6, pp. 22-25.

Studying basic groups of plants influences the development of pupils' knowledge concerning systematics and the evolution of plants and makes it possible for them to understand the historical development of organisms, as well as the laws which govern the adaptation of plants to the environment. The author describes a series of 18 teaching lessons in which he analyses, together with his pupils, the structure and living function of organisms, beginning with bacteria, up to angiosperms living under various conditions. Some key problems are dealt with in greater detail.

463. STRAUSS, W.: Heilmittel oder Gift ? (Drogenpflanzen und Pflanzendrogen) (A cure or a poison ? Plants provide drugs and drugs are made of plants)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 7, pp. 193-216. 15 figs. 5 tabs.

Medicinal plants and the medicinal substances derived from them have been used since ancient times. In the Egyptian pyramids the root of liquorice (Glycirrhiza glabra) have been found, while the Duchess of Cinchona was cured of malaria by an Indian witch-doctor with cinchona bark; the oldest medicinal plant is Tussilago farfara, etc. The author provides a survey of various drugs derived from plants and describes the cultivation of medicinal herbs since ancient times until the present. He describes the best known drugs and the substances they contain, such as fatty oils, essential oils, glycosids, saponin, tannin, alcaloids, etc. He also discusses the cultivation of medicinal plants and the technology of their processing. In conclusion the author discusses the medicinal use of various substances and their misuse as habit-forming drugs. For teaching he suggests the use of 15 lessons divided into 6 partial topics. A table is attached concerning the division of the subject-matter into individual lessons.

464. TOPF, H.: Modellhafte Darstellung der "Photosynthese" und der "Biologischen Oxydation" in Klasse 9. (The model presentation of "photosynthesis" and "biological oxidation" in the 9th class).
Biologie in der Schule, 30, 1981, No. 12, pp. 512-515. 3 figs.

Both the topics cited in the title are suitable for teaching with the aid of models, which make it possible to better understand biological processes. Since these models are not properly shown in the textbook or the methodological handbook, the author has developed his own models for both processes. The article is devoted to both to an outline of photosynthesis, as well as respiration and the relation between them.

465. WEBER, H.: Überwinterung bei Pflanzen (The wintering of plants)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 9, pp. 297-307. 2 worksheets, 11 tabs.

Plants prepare for the winter by forming ripe seeds, accumulating nutrients in some organs and by developing winter buds for the reproduction of the part of the plant found above ground. The wintering of seeds maintains the species in annual and perennial plants. The author discusses opportunities for discussing these problems with the use of slides and freshly collected or herbalized material. He also describes a number of suitable experiments and observations concerning the wintering of plants, such as for instance the ability of dry and swollen seeds to germinate in relation to low temperatures, water intake by plants in frozen and unfrozen soil and the stratification of seeds.

466. SZPOK, Z.: Fotosynteza i jej znaczenie (Photosynthesis and its significance).
Biologia w szkole, 34, 1981, No. 1, pp. 54-55. 2 tabs.

The author here develops the outline of a teaching lesson in the 6th class of basic school which concerns problems of photosynthesis as one of the didactically most difficult problems in biology teaching. To make this topic easier to learn it is important to teach it in a sequence of specific notions. The author recommends a very detailed didactical structuralization of the topic. The teaching objective here is to learn about the external factors which influence the process of photosynthesis (light, water, carbon dioxide, temperature). Also a localization of the process is provided, its gas metabolism, the accumulation of photosynthesis products and the importance of the process, as well as the difference between photosynthesis and assimilation. During the course of the lesson the following notions and terms should be explained: photosynthesis, assimilation, autotrophy, parenchyma in fungi, intercellular space, ducts, conductive tissue, reserve tissue, chlorophyll, solar energy, sucrose, starch, proteins, fats, cellulose, carbon dioxide, oxygen, water. During the lesson, the pupils should also learn how to plan their work, make observations, interpret findings, analyze tables and diagrams, combine aspects of structure with those of function and to make comperions.

12.22 Preparations for zoology instruction

467. ALTMANN, A.: Hadi (Snakes)
Přírodní vědy ve škole, 32, 1980/1981, No. 10, pp. 367-369.

Within the framework of the thematic unit Reptiles (4 lessons), in the zoology course taught in the 6th class of basic school, only 4 species of reptiles are taught. This article provides further information concerning the latest findings about snakes. The author points to possibilities of using problem teaching on the subject of how snakes swallow large victims whole. The article also includes colour photographs of exotic snakes.

468. ALTMANN, A.: Klíště obecné (The hard tick)
Přírodní vědy ve škole, 32, 1980/1981, No. 9, pp. 333-334.

In the 6th class the order Acarina are studied, and especially the hard-tick (Ixodes ricinus). During its development the stages of a single larva, nymph and adult tick alternate. The hard-tick belongs among organisms with three hosts, but it can also develop on only two hosts. The period of development depends on how quickly the tick finds a suitable host. Adult ticks who suck blood are always females. When sucking, they inject saliva into the would which contains substances which make the bite insensitive and prevent the coagulation of blood. With this saliva the ticks can also transfer to the blood of the host (for instance man) viruses, rickettsia, leprospirosis and pathological bacteria.

469. ALTMANN, A.: Myslivost a výuka zoologie na základní škole (Game-keeping and zoology instruction in basic school)
Přírodní vědy ve škole, 32, 1980/1981, No. 4, pp. 128-129.

The pupils encounter the notion of game-keeping in the experimental textbook for biology teaching in the 6th class and in the context of the topic game mammals. By game-keeping we mean the rational breeding and conservation of animals for hunting and for their economic utilization. Game-keeping begins with breeding and conservation and ends with hunting animals and their subsequent utilization. The most important aspects of game-keeping it its national economic utilization as a source of meat. Game-keeping not only broadens the range of foods we eat, but also provides industry with valuable raw materials (skin and fur). Besides game as a source of meat, also the catching of live animals is important, which are then exported for valuable hard currency. Game keeping also contributes to international tourism. In the zoology course in the 6th class of basic school it should be stressed that game keeping should not be approached as only a favorite leisure time activity or specific kind of sport, but also as systematic and planned activities connected with the conservation of various species of animals which live in this country and the considered hunting of animals which leads to maintaining their adequate equilibrium numbers, in view of the available food and the health of the animals.

470. ALTMANN, A.: Ptáci kolem lidských obydlí a v zahradách (Birds found in the vicinity of human settlements and in gardens)
Přírodní vědy ve škole, 32, 1980/1981, No. 5, pp.171-172.

In the zoology course in the 6th class of basic school the topic cited in the title of the article is part of the teaching syllabus. This topic is especially important from an educational point of view. A modern stand should be taken concerning this topic, which concerns especially the problem of feeding birds in the winter and the fact that some bird species have multiplied in large numbers in the vicinity of humen housing; also problems of hygien and health hazards are important in this context. If people are to feed birds in the winter they should know something about bird food, which can be greatly varied. We should be aware of the fact that feeding can often be damaging to birds. The systematic feeding of birds in a bird box leads to a situation where the birds prefere the bird box and overlook their natural food sources. Ornithologists recommend feeding birds in the winter only when it is expectionally cold or there is great deal of snow. The author discusses in detail the wintering of some bird species.

471. BERLIŃSKA, B.: Budowa i tryb życia pojąka krzyżaka (The body structure and way of life of the diadem spider) Biologia w szkole, 34, 1981, No. 3, pp. 179-180. 1 fig.

The author discusses the diadem spider as a suitable object for studying the external features of the body structure of spiders and anthropoda. The work is based on the observation of live, as well as mounted spiders, pictures, slides and possibly also microscopy specimens. The lesson is composed of an introduction, organizational preparations, solving a cross-word puzzle, dealing with the body structure and way of life of the diadem spider and with practical excercises, work with living and mounted specimens, the independent recounting of what pupils have seen in a TV program, learning basic terms, a summary, homework and the writting up of notes. The author cites a number of interesting facts concerning these spiders, which the teacher can make use of during the lesson to improve pupils' motivation and to make the subject-matter more interesting. For homework the pupils can look for spiders, describe the environment in which they live, how they move on the ground, in a cobweb, how they hunt and the colour of their bodies. Also recommended reading on this topic is provided.

472. BOHÁČ, I.: Saranče - didaktický model hmyzu (The blue-winged locust as a didactical model of an insect)
Přírodní vědy ve škole, 32, 1980/1981, No. 5, pp.165-167.

The biology textbook for the 6th class of basic school cites the blue-winged locust as model for learning about insects. Locust belong to the order of Orthoptera, the suborder Acriddidae. In a very clear table the author provides the main characteristics which distinguish it from the Ensifora suborder (which includes grasshoppers). A laboratory excercise entitled "Observation of the external body structure of the locust" should, for didactical reasons be dealt with only after the topic "Insects" has been done. According to the teaching syllabus this laboratory work should be done at the end of January and for this reason the necessary number of locusts should be caught and preserved in the summer. The author provides a detailed description of how this can be done, including the catching, killing and fixation of the locusts. The essential part of the article deals with these practical problems connected with the laboratory excercise. Also the morphology of the locust is described in detail, on the basis of observations with the naked eye and with a magnifying glass.

473. TSVETKOV, T. - DIMOVA, S.: Evolutsiyonno-ekologicheski podkhod v prepadavaneto na temata "Biologichni osobenosti na ptitsite" (An evolutionary and ecological approach to teaching the topic "The specific biological characteristics of birds")
Biologiya i khimiya, 24, 1981, No. 2, pp. 38-44.

This topic is developed in such a way that pupils are able to derive the basic characteristics of birds by themselves and to classify them according to the environment in which they are found, to which they have adapted. According to sketches of bird beaks and feet they are able to determine a bird's way of life and its adaptation to the environment. At the same time they learn to understand the progressive evolutionary traits of individual species.

474. CZAJA-TOPIŃSKA, J. - WYCHIECHOVSKA, A.: Róznorodość form bezkręgowcow (The variaty of forms of invertebrates)
Biologia w szkole, 34, 1961, No. 3, pp. 161-166.

The author provides outlines for teaching lessons in the 7th class of basic school and in the 2nd class of general education secondary schools concerning the subject-matter of insects. The common characteristics of the class insects are extended for the general education secondary schools with topics concerning the life and structure of insects, the significance of insects in nature and in the economy of man and also protected insects. The author stresses the educational and teaching objectives of this subject-matter, which basic knowledge should be learnt, attitudes, methods and teaching aids and also provides some comments on how to deal with the topic, based on her own teaching experiences. Suggestions are also made for homework assignments which should be given to especially bright pupils or to hobby clubs. Also the possibility of breeding some species of insects in the classroom are discussed, either on a permanent basis or temporarily.

475. DYLLA, K.: Rettet die Kröten. Materialen zu einer Unterrichtseinheit in Klasse 5 (Save the toads ! Topics for teaching in the 7th class) Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 4, pp. 119-124. 3 figs., 1 transparency, 3 worksheets.

The author provides information for a teaching lesson devoted to nature conservation problems. The start of this project was the building of a hedgerow in the vicinity of the school in the early spring, which served to protect toads from automobile traffic on a nearby road during the period when the toads carry out their seasonal movements towards water in order to copulate. The author made use of this motivation to organise pupils′ work and also to use this topic for teaching, where in the classroom he explained the life cycle of the toad to pupils, the structure of their bodies, but also how they reproduce, the development of the eggs, tadpoles and adult toads and their behaviour. The author also prepared 3 worksheets and the draft of a transparency for an overhead projector.

476. FYLLA, K.: Winterfütterung - Falscher Mitleid ? (Winter feeding - false compassion ?) Naturwissenschaften im Unterricht, 20, 1981, No. 2, pp. 33-48. 7 worksheets, 3 surveys, 3 tables, 3 picture tabs.

The author recommends including 6 teaching lessons concerning the winter feeding of birds into biology instruction in the early classes of general education secondary schools. The topic should analyse from an factual and situational point of view the problem of feeding birds in the wintertime. Such an analysis will yield a number of arguments for bird feeding but also a number of points against this practice, and especially against unsuitable feeding. Bird feeding provides school children with the opportunity to observe the life of birds living wildly and to extend their knowledge of the birds which live in our country. I thus provides a didactically positive form of activity which contributes to the forming of positive attitudes on the part of pupils towards nature. On the other hand feeding causes unnatural gatherings of various species of birds and hence also the possibility of spreading samonellosis. Fedding also causes weak and sick birds to survive the winter, thus interrupting natural selection and the survival of the fittest. The population of urban birds has been increasing (for instance the House sparrow, Blackbird, Collared turtle-dove). When migratory birds return after the winter from the south they do not find opportunities for building nests and an ample supply of food. Birds which are really threatened do not feed in bird boxes. Larger numbers of weaker birds survive, have smaller numbers of eggs and so their population does not increase anyway. Non-migratory birds are adapted to winter conditions (they have larger numbers of eggs and they nest several times a year). The survival of less resistant individuals is a threat to the population. Unnaturally tough competition arises for returning migratory birds (for instance the Titmouse). In the FRG over 12 000 000 DM are spent for the winter feeding of birds. This money would be put to better use for nature conservation purposes. If we insist on feeding, then we should take care to provide food without salt, without water, mold and infections. When a winter is mild we should not feed at all, only when a winter is very harsh. Not only song birds should be fed, but also birds of prey and owls. Natural sources of food should be allowed to thrive (such as berries and weeds). In conclusion the author divides this subject matter into individual lessons and comments the worksheets and surveys provided with the article.

477. HINTERMEIER, H.: Vögel als Inhaber ökologischer Nischen (Birds as the owners of an ecological habitat niche)
Naturwissenschaften im Unterricht, 20, 1981, No. 6, pp. 168-179. 1 fig., 1 tab., 5 worksheets.

Schools now teach basic terms and notions concerning ecology. These include food chains, food networks and food pyramids. However, the term food niche is often overlooked. Ornithologists estimate that there are about 100 million birds in the world, that is 20 times as many as there are people. While people have problems with food, birds do not. There are 9000 different species of birds and yet they do not compete with each other. The author describes the distribution of birds in various biotas and how various niches are utilized by them. In a purely pine forest there will be 23 nesting birds on 10 hectars of territory, including 8 species, while in a spruce forest 72 nesting birds of 20 species and in a mixed forest 121 nesting pairs of birds of 35 different species. The author discusses closely related birds which, however, from a food niche point of view differ entirely (the Blackbird and Thrush, the Wood pigeon and Stock dove, the Goshawk and the Sparrow hawk, Woodpeckers and Creepers, the Titmouse and the Redbreast). Related species seek food at various places of a biota, they differ in the food they eat and the season in which a particular food is sought, while different species seek food at different times and while living in the same environment they make different uses of it and build nests in different places. In conclusion the author offers comments on bird conservation.

478. KÖNIG, H.: Zur Behandlung des Rinderbandwurms in der 7. Klasse (On teaching about the Beef tapeworn in the 7th class)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 5, pp. 134-138. 4 transparencies.

The author provides the outline for teaching the topic Human parasites in the 7th class. He describes the present situation in the spread of the Beef tapeworm (Taenia saginata GOEZE, 1782) and the cause of its widespread existance (due to the recent popularity of raw beef as human food). In spite of the fact that schools have at their disposal original mounted objects, as well as slides, the best teaching aid is the making of a tapeworm model by the pupils. When combined with proper motivation, this is shown to be the best stimulus to pupils' activity in class and effective instruction. The author describes the teaching lesson and points to the possibility of using problem assignments based on comparisons (the Beef tapeworm and the Earthworm). The main motivation for pupils is the adaptation of the Beef tapeworm to conditions existing in the human intestine. The outcome of instruction should be knowledge of the life cycle and the alternation of hosts (cattle and a man), as well as the ecology and biology of this parasite.

479. LIEB, E.: Mehrfachbildungen bei Hühnereiern
(Multiple forms in chicken eggs)
Naturwissenschaften im Unterricht - Biologie, 29, 1981,
No. 8, pp. 270-272. 2 figs.

The reproduction of animals is a very interesting topic for pupils. In the course of its teaching pupils tend to ask a number of questions; one such question is what happens when 2 sperms enter an egg simultaneously. Polyspermy (the penetration of an ovum by multiple spermis) is known to exist in birds, reptiles, a number of molluscs and insects. This is so-called physiological polyspermy. In mammals an egg is penetrated by only one sperm which causes the egg membrane to change into an inpenetrable barrier to other sperms. In bird eggs, however, twins can be born out of a single egg. 4 types of bird eggs should be distinguished, which can lead to the development of multiple embryos from a single egg. Eggs with a double yoke develop with a liklihood of 1 : 2000 up to 1 : 500. There are types of bird eggs which have two "eyes" or macula germinativa, but they are very rare and may be the result of the fusing of two yokes. From these eggs, if they are fertilized and successfully brought to term, dizygotic twins are produced. There are also eggs with three egg-yokes (with a frequency of 1 : 1 000 000). Double yokes can easily be determined by the simple lighting up of the egg.

480. LIEB, E.: Warum die Vögel so grosse Eier legen
(Why do birds lay such big eggs)
Naturwissenschaften im Unterricht, 29, 1981, No. 5,
pp. 145-152. 1 fig., 4 transparencies.

The article describes the structure, size and weight of bird eggs in relation to the body weight of the bird and the weight of all the eggs in a nest. Also the shape of eggs is discussed. All this is dealt with in the context of the adaptation of birds for flight and specific aspects of the biology of nesting. The term "absolute size of a bird egg" is explained and the relation between the shape of the egg and nesting biology. Pupils should be led towards the conclusion that a comparison of the size of two bird eggs can be illuminating only when the size and weight of the bird specie is taken in account. Mathematical calculations can lead to very surprising findings.

481. PESCHKE, H.J.: Überwinterung wechselarmer Tiere (The wintering of animals with a variable body temperature)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 9, pp. 314-322. 5 figs., 2 worksheets.

Animals with a variable body temperature have an entirely different metabolism, body temperature and enzyme producing apparatus than animals with a constant body temperature. This makes it possible for them to survive the winter period by special energy saving methods. The author describes how various animals survive and compares the life of a carp fish and a trout in the winter time. The worksheets serve for assignments. The author recommends devoting a total of 6 to 8 lessons to this topic, where also such problems can be dealt with as why animals have a variable body temperature, to what extent are life processes in animals with variable body temperature dependent on the temperature they have, how do animals with variable body temperature living in water survive the winter and how do terrestrial animals do this.

482. PRZEKOP, R.: Pochodzenie ptaków. Lekcja w klasie III LO (The origin of birds. A lesson in the 3rd class of general education secondary schools)
Biologia w szkole, 34, 1981, No. 2, pp. 114-115. 1 fig., 2 tabs., 1 crossword puzzle.

The author here deals with one of the topics in the syllabus section called "Reptiles as the ancestors of birds and mammals", which is taught in the 3rd class of general education secondary schools. The objective of the lesson is to learn about the variability of organisms and their evolution. The author recommends using the illustrations found in the textbook, drawings and an overhead projector. Also problem teaching can be used. She recommends using the following diagram:

fish ------- Ichthyostega ----- amphibians ...... Seymouria
----- Archeopteryx --------- birds
------ reptiles ------
--------- Cynognathus ----- mammals

The evolution of birds occured 70 million years ago; Archeopterys represents a transitional form between reptiles and birds. Birds developed in the Mesozoic era as Thecodonts belonging to the Diapsida. The most privitive birds from the Cretaceous period were Hesperornis and Ichthyornis. The Tertiary era is a period when birds and mammals are already dominant.

483. SCHLEIN, A.: Wärmeisolation in Technik und Natur (Thermal isolation in a technical and natural context)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 9, pp. 307-313. 2 worksheets.

The author deals with three parts of a thematic unit concerned with thermal isolation in technology and in the animal world. 1 to 2 lessons are devoted to the physical basis of thermics, 1 lesson to technical applications of thermal isolation and 1 lesson to thermal isolation among animals. On the basis of learning basic thermal notions and terms (the movement and energy of molecules, the notion of temperature, the exchange and transmission of heat, evaporation and temperature, etc.), the pupils become acquainted with the increasing consumption of thermal energy among the inhabitants of the Northern hemisphere, the need to conserve energy, improve isolation and prevent heat losses. 44 % of the energy produced is used by households and of this amount 90 % is for heating. The author describes a number of tested experiments which serve to demonstrate that substances can exist in a solid, gas and liquid form, that atoms, molecules and ions are the smallest building particles which are never inert, but are constantly moving. The movement of particles is manifested in producing heat which can be measured with a thermometer. Particles of a specific uniformly heated body have, on the average, the same movement energy. The more rapidly the particles in a body move, the more space they require, i.e. bodies whose temperature is increasing, expand and their density decreases. Only water at a temperature of 4 °C shows an anomaly. Other experiments concern the exchange and transmission of heat. The basis of isolation technology is air as a poor conductor of heat. The utilization of this fact is demonstrated in household applications (windows).

484. WINKEL, G.: Vegetative Fortpflanzung (Vegetative reproduction)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 11, pp. 422-429. 1 picture tab., 4 photographs.

Reproduction can be divided into non-sexual or vegetative and into sexual or generative. The article concerns vegetative reproduction in biology instruction and its utilization by man in the cultivation of plants. The topic is dealt with in view of the practical availability of plants for reproduction in school. When teaching this subject, normally attainable plants are used which grow wildly or indoors. Also some plants not usually used for these purposes are described. The teacher will find practical advice and instructions for vegetative reproduction using various methods. This then makes it possible to organize practical assignments by pupils who can use shoots, bulbs, tubers, running shoots (stolons) winter buds, as well as various cuts for various types of propagation. Special attention is paid to indoor plants.

485. WITT, W.: Die Überwinterung gleichwarmer Tiere, Dachs und Hamster (The wintering of warm-blooded animals - the badger and hamster)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 9, pp. 322-330. 5 figs., 4 worksheets.

This topic should be taught in 5 teaching lessons. It deals with the problem of winter hibernation and dormancy. 2 lessons are devoted to the winter dormancy of the badger, where the pupils learn about this animals´ body structure, ecology and biology and how it survives the winter. 2 lessons are also devoted to the winter sleep of the hamster. The article also contains 4 worksheets on this topic, together with supplementary information and the design of transparencies.

12.23 Preparations for instruction in the biology of man

486. BADE, L.: Aggressionstheorien als Gegenstand des Biologieunterricht (Aggression theory as a topic for biology instruction)
Der Biologieunterricht, 17, 1981, No. 3, pp. 27-44.

The author develops a topic concerning the aggressivity of animals and man for use in the biology course in general education secondary schools. The article provides factual and brief information on individual theories of aggression and the didactical development of this problem in class. The author discusses the importance of this subject-matter for solving pupils' various situations in life. The subject itself is of an interdisciplinary nature and requires knowledge not only of biology, but also psychology, ethology, ecology, genetics and neuro-physiology. On the basis of aggression theory, the author also discusses problems of frustration, psychoanalytical instinct theory, a dynamic instructive model of aggression according to K. Lorenz, learning psychology theories of aggression and its psycho-physiological model. Also various aspects of human aggressive behaviour are dealt with (in relation to finding food, combat between rivals, combat for territory, aggression as defensive and attacking behaviour, group attack against a group of enemies, frustration aggressiveness, aggression and social hierarchy, aggression on the part of young animals in attaining social status, playful aggression, etc.). The article also deals with the ethological basis of human aggression and its specific aspects. In conclusion the author provides recommendations for teachers concerning the teaching of this important topic. The topic is divided into 10 teaching lessons.

487. BERGMANN, H.H.: Aggression-Bemerkungen zur Biologie des Kampferhaltens (Aggression - comments on combative behaviour)
Der Biologieunterricht, 17, 1981, No. 1, pp. 4-27, 12 figs.

The article deals with problems of aggressive behaviour and combative behaviour. Their manifestations are described, as well as a definition of aggression and the situation in which it develops among animals. During the last 20 years scientists have been studying this problem extensively and now two schools of thought on this subject have developed. According to one, human intelligence is above all determined by genetic factors, while the second claims that intelligence is achieved by learning in an individual´s development. A large amount of literature on the subject is now available. This problem is also suitable for teaching in school, within the framework of human biology. Aggression is a component of the social behaviour of a species towards members of its own specie, which does not, however, serve directly for gaining food. Among the members of the same specie, priority is given to mutual combative and threatening posturing and pretended combat before serious struggle; in other words immediate physical combat is replaced by communicative interaction. Aggression comes into its own when a territory is being defended, maintaining individual distances and in maintaining status in a social hierarchy; also intersexual aggression, parental aggression, aggression in weaning breast fed young, defensive aggression against an aggressor, against a food competitor, against someone who poses a threat to the young of the individual, etc. are discussed. Aggression is a natural biological phenomenon with a biological function and it forms a subject of evolution. In other words aggression is genetically coded as a basic biological phenomenon. The author also discusses problems of aggression and competition, triggering mechanisms in aggression, preparations for aggressive behaviour, motor coordination, problems of serious inter-specie combat, preening, threats and quieting fears and long-term and short-term influencing of aggressive behaviour. All examples are based on an ethological context, concerning both animals and humans. Findings concerning ethological studies of animals cannot of course, be considered valid for humans.

488. BRUNNER, U.: Physisch-psychisch geschädigte Kinder - ihre Probleme gehen uns alle an (Physically and mentally handicapped children - their problems concern us all)
Biologie in der Schule, 30, 1981, No. 6, pp. 255-259.

At present about 500 million handicapped persons live throughout the world. In the G.D.R. care of the handicapped is considered to be the task of society and every handicapped person is guaranteed participation in "normal" life. One of the tasks of all biology teachers should be to discuss this problem with their pupils. The author deals in detail with oligophreny and distinguishes idiocy, imbecility and debility. Oligophrenic children typically have decreased perception, lower ability to concentrate, poorly developed speech, memory and a decreased ability to social adaptation. For the development of such children it is important that the demands made upon them be in accord with their abilities, which the author specifies for various categories. The curriculum of special schools should be adapted to these demands, while at the same time they should aim at purposefully influencing these children in a corrective manner.

489. BRUNCVT, Y.P.: *Varianti provedeniya vvodnogo uroka i temi "obshchiy obzor organizma cheloveka" v kurse biologii VIII klasse* (Alternatives in teaching the introductory lesson of the topic "General survey of the human organism" in the biology course in the 8th class)
Biologiya v shkole, 55, 1981, No. 4, pp. 31-36.

This problem was taught in the course of 8 teaching lessons according to the previous teaching syllabus. The improved syllabus has now done away with various duplicities, especially in the general biology course, and has deleted some of the more complex problems, so that now 4 lessons are considered sufficient. They include the following:

1) Introductory lesson: the organism of humans and mammals; the hygiene aspect of nature conservation, man as a bio-social individual;
2) The structure, function and reproduction of cells;
3) Epidermal, muscle and nerve tissues;
4) Reflexes and reflex arches.

The article develops in detail the methodologies it recommends.

490. DOBROWSKY, S.: *Müssen auch Jungen Hauptpflege treiben ?* (Do young people also have to take care of their complextion ?)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 7, pp. 221-227. 2 worksheets.

Skin care is an important area of modern medicine and pharmacology. The author provides a definition of the health and disease of the skin and discusses historical experiences with skin care, such as for instance so called Kneipping (Kneipp was a physician who stressed the use of baths and water in medicine, including water massages, washing, compresses, excercises in damp grass, movement and correct nutrition based on a well-rounded diet, eaten in small quantities using very small quantities of spices and savories, phytotherapy, etc.). The author also discusses the importance of the skin (an organ of excretion, regulation of the body temperature and storage place for nutrients). Stress is placed on regular baths and skin cosmetics. Theoretical aspects of the problem are combined with practical problems. Pupils make facial masks of cucumbers, bath oils, beauty creams and after-shave lotions for their fathers. The article includes detailed recipes for making these substances.

491. DUSSA, U. - WILDELBAND, A.: Zum problemhaften und erziehungswirksamen Gestaltung der Stoffeinheit Humangenetik in Klasse 10. (On an educationally effective and problem orientated approach to the topic of human genetics in the 10th class)
Biologie in der Schule, 30, 1981, No. 10, pp. 410-420.
2 tabs., 4 figs.

In this part of the biology course pupils should learn about the laws of genetics which are valid for man. The study of twins has brough important findings concerning genetic processes taking place in man. The misuse of genetics represents a serious danger; for humanitarian reasons all manipulation with the human genotype should be avoided; transmitting negative genetic qualities to posterity is incompatible with man's responsibility towards society and our children. The author recommends devoting three teaching lessons to this topic, which he describes in detail, as well as the teaching objective of each lesson and the problem situations which can be solved.

492. GEBHARDT, R.: Zur methodischen Gestaltung der Stoffeinheit "Die Stammesentwicklung des Menschen" in Klasse 10. (Concerning a didactical concept for teaching the topic "The phylogeny of man" in the 10th class)
Biologie in der Schule, 30, 1981, No. 12, pp. 510-511. 1 fig.

The author describes his experiences with taking pupils on a visit to a museum. Before the visit pupils received specific assignments, such as for instance to determine differences and agreements between the skeleton structure of primates and man, to distinguish the degree to which the exhibited primitive implements were adapted to their purpose, to make a map of findings concerning the ancestors of man, etc.

493. GLOBIG, H.: Zum aktuellen Thema (Concerning a current topic)
Biologie in der Schule, 30, 1981, No. 4, pp. 161-162.

The materials suggested for use in teaching in the 8th class are of excellent quality. The system of described body organs does not, however, include the respiration system and the picture showing gas metabolism is not sufficiently clear. The chapter on the negative aspects of smoking is very well written.

494. HAHN, M.: Müssen Haltungsschäden sein ? (Must faulty posture exist ?)
Naturwissenschaften in Unterricht - Biologie, 29, 1981, No. 12, pp. 441-447. 7 figs., 1 appendix

The author deals with the topic concerning the supporting and motor system in humans in connection with faulty posture, the development of defects in this area and how they can be prevented among school youth. Faulty posture and defects of the spinal column are relatively widespread among students. Essentially this is a civilizational disease and the author discusses it in the context of biology instruction both in basic school and in secondary school. Some of these problems are already known to pupils from elementary school. The aim of this topic is to motivate young people towards correct posture and to acquaint them with the possibilities of spinal defects and their prevention.

495. KOLLENDER, F.: Versuch einer Beeinflussung von Schülersgewohnheiten im Rahmen einer Unterrichtseinheit "Nahrung und Ernährung beim Menschen" in Klasse 5 (An attempt to influence pupils´ habits within the framework of the topic "Food and human nutrition" in the 5th class)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 4, pp. 97-110, 4 worksheets, 3 figs., 4 models for transparencies.

This article concerns an aspect of health-care education, specifically education towards correct nutrition. The population at large and pupils in school do not have sufficient knowledge concerning the principles of correct nutrition, as all teachers can see every day. The author therefore suggests teaching a topic concerning correct nutrition to which 12 teaching lessons should be devoted in 6 units, including problems of calculating individual needs in energy consumption, how this need should be covered by food intake, the relation between the distribution of food intake during the day and performance, the importance of a first and second snack during the day, five daily meals, the planning and eating of breakfast in school and games as a strategy for influencing behaviour in this area. The article also comments on the need for educating parents in this respect.

496. KHAMDAMOVA, T.K. - BRUNOVT, Y.P.: K izucheniyu gigienicheskogo materiala v kurse biologii VIII klassa (Concerning the teaching syllabus on hygiene in the biology course in the 8th class).
Biologiya v shkole, 55, 1981, No. 3, pp. 36-39.

The biology course in the 8th class should provide pupils with knowledge of basic hygienic standards of behaviour and to form in them a conviction of the necessity of adhering to hygienic rules of behaviour. This subject-matter is the basis of understanding the demands made by hygiene and medical prevention in a socialist society. Thus the pupils´ knowledge in this area should be permanent and profound. The article cites two alternative methods of acquainting pupils with this subject-matter:

1. hygienic recomentations are summed up after an exposition of each problem in the form of practical conclusions made on the basis of the subject-matter;
2. in the course of each lesson partial conclusions are made on the basis of what has been learnt concerning the need to maintain specific hygienic rules.

On the basis of a study, the author show that the second alternative was more successful and that the pupils had a 25 % improvement in knowledge gained in comparison with the first method. The article also describes in detail the methodological procedure which should be used in expositions of individual chapters on human biology.

497. HOFFMANN, W. - THIEL, W.P.: Überlegungen zur verhaltenen biologischen Betrachtung des Menschen im Unterricht (Considerations on the limits of biological determination of man in teaching)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 4, pp. 117-120.

The authors discuss biology teaching in connection with the problems of human behaviour and how these aspects are taught in secondary schools. They stress the need to use logical procedures when teaching human ethology and stress the problems which arise when human ethology is taught together with animal ethology. The essence of the problem is that ethological findings concerning animals cannot be directly transfered to a study of humans. It would be incorrect to overestimate the importance of congenital behaviour in humans, or conversly to underestimate the importance of social learning in the context of human behaviour.

498. NEUMANN, G.H.: Aggressivität und Aggressionen des Menschen als Thema des Biologieunterrichts (Aggressivity and aggression in man as teaching subjects in the biology course)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 4, pp. 107-117. 3 appendixes, 5 tabs., 2 figs.

The author recommends the subject-matter cited in the title as a teaching topic in the final classes of general education secondary school. Aggressivity is defined as the preparation for aggression, while aggression is defined as actual behaviour on the part of a person. Aggressivity and aggression are phenomena which concern not only biology, but also other disciplines. But biology provides the best basis for teaching this topic. It is important that pupils become acquainted with those aspects of the theory which are important from an educational point of view. Persons without any aggressivity or aggressive behaviour do not exist. The ethology of animals can serve as a point of departure for the study of human aggression, so that such terms as intraspecie aggression which is manifest in 9 different relations (acquisition of food, reproduction, combat with rivals, self-defence, group behaviour, social status, protection of territory, attack of foreigner in own midst and reaction to frustration) are explained.

499. NEUMANN, G.H.: Das Menschenbild der Humanethologie und seine Bedeutung für Schule und Biologieunterricht
(The image of man in human ethology and its importance for school and biology instruction)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 4, pp. 97-103. 7 figs.

Human ethology is a modern science which studies the behaviour of man and attempts to distinguish congenital and learned behaviour. An important finding of this science is the fact that man is not a purely cultural personality, but also a natural one. Human behaviour is composed of an inborn component and one which is individually learnt. Especially our sexual, social and aggressive behaviour are influenced by heredity. Not all inborn aspects of the personality are adaptive to our civilizational environment, even if congenetive components of the personality can, in the majority of cases, be influenced by education and the cultural and ethical environment. But man is not infinitely adaptable. The article analyses various components of human behaviour. As a consequence of the population explosion, increasing numbers of people live in concrete cities in anonymous societies, which produce frequent symptoms of stress and various social problems. Man has the same genes as 50 000 years ago when he was a hunter and collector, but since then the world has greatly changed. Man is now full of contradictions, on the one hand flights to the moon are undertaken, while at the same time wars continue to exist. On the basis of a theoretical analysis of human behaviour the author suggests 6 topics for the upper classes of secondary school, which include the following: the ethology of the neonate, scientific methods used by human ethology, human sexual behaviour, human aggressive behaviour and the ethological image of cultural man.

500. PFANNSTIEL, G.: Geschlechtsspezifische Differenzen am menschlichen Becken (Sex specific differences in the human pelvis)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 5, pp. 148-152, 1 tab., 2 models for tables.

The author deals with differences between the sexes from the point of view of the human pelvis; this topic can be included into the biology course in the upper classes of secondary school. Basic characteristics of a pelvis are apparent in various qualities depending on the sex of the person from which the peliv comes. 6 photographs demonstrate the author's analysis; the method used is important for archeology, criminology and demography.

501. SCHULER, F.: Auch für den Menschen gilt: "Der nächste Winter kommt bestimmt" ("Next winter will certainly come" is also valid for man)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 9, pp. 330-336. 3 worksheets.

This topic is recommended for 3 to 6 teaching lessons. During the first 2, the problem of equilibrium systems is dealt with and in the next two lessons problems connected with economies of heat as an expression of dynamic equilibrium are explained. During the last two lessons problems of how man adapts to cold weather are dealt with. Human body temperature is an example of an equilibrium situation. Adaptation to a cold environment has made it possible for man to populate the cooler regions of the Earth. This subject-matter assumes that pupils are acquainted with basic terms in physics and mathematics. The topic is suitable for the intermediate classes of secondary school. Problems connected with maintaining and conserving heat (for instance by eating energy-rich food)and by the biological regulation of temperature are explained in detail.

502. SCHWARZ, E.: Speicheluntersuchungen - Neunzig Minuten forschender Unterricht (A study of saliva - ninety minutes of research teaching)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 3, pp. 65-70. 3 figs., 2 tabs.

The author describes how during two lessons on human biology, his students did research within the framework of problem assignments. The main problem given was: is saliva composed of water ? (the author here demonstrates how a hypothesis is formed and then examined to see whether it is true or false). The students were given several alternatives: saliva is only water; saliva is composed of water and other substances; saliva does not contain water; saliva contains particles which are larger than water; saliva contains long fibre-like types of molecules; saliva contains molecules of proteins; protein in saliva influences the sliding movement of food in the digestive tract. These experiments do not concern the traditional experiment to prove the effect of the enzyme ptyaline on starches. Rather on the basis of observations and experiments the pupils make their own conclusion and are capable of demonstrating the composition of human saliva. Saliva thus is found to contain not only water, but also air bubbles, the muscous-like protein mucin, the enzyme pytaline, substances which determine the blood group of the person, ions of Na^+, K^+, HCO_3^-, Cl^-, fluorides and calcium salts. Human saliva is thus an interesting object of study.

503. STRAUSS, W.: Pharmakognosie im 9./10. Schuljahr - Meiden ("Pharmacognosy" in the 9th and 10th classes - teaching media)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 7, pp. 237-251. 8 figs., 4 tabs., (survey of films).

On the basis of the topic "pharmacognosy" which can be taught in the 9th or 10th class, the teacher can practically demonstrate the possibility of using various teaching media. The author cites a large number of various media, beginning with the relevant literature, including fiction, poetry and theatrical plays, as well as press clippings, pressings from all old herbariums, photographs, films and posters. All these media can be used to increase motivation, as well as for the purpose of analysis during classwork. For all the media mentioned the author discusses their best class use.

504. SZURA, M.: Czynności i budowa przewodu pokarmowego (The function and structure of the digestive system)
Biologia w szkole, 34, 1981, No. 2, pp. 116-119. 3 tabs., 1 fig.

The article is an outline for a teaching lesson in the 8th class of basic school. The class can be divided into groups of 4 pupils. Each group receives basic didactical media and instructions for working, as well as tables which require filling in as independent work. The pupils make solutions of various chemicals, a solution of starch, proteins, gastric juices, a solution of NaOH and pancreatic juice, as well as a Haynes solution, a Lugol solution and a phenophtalein solution. Various groups then do experiments with the digestion of starch in the oral cavity (the effect of ptyaline), the digestion of starch in the stomach and the digestion of various food components by pancreatic juices. Instruction is thus based on independent observations and experiments. At the conclusion of the third teaching lesson the subject-matter is summed up and conclusions drawn.

505. VOGEL, G. - SIEBERT, B.: Phenylketonurie - eine erblich bedingte Stoffwechselanomalie. Model für die Sekundarstufe II. (Phenylketonuria - a congenital metabolism anomaly. A model for use in the upper classes of secondary school)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 6, pp. 171-183, 1 transparency, 1 worksheet, 16 figs., 4 tabs.

The author suggests the use of this topic during two teaching lessons. He explains a typical congenital recessive phenomenon where enzymes are lacking in the gene-enzyme relation so that the forming of protein chains needed for the metabolism process is defective. By studying these metabolism chains the pupils can learn to understand the blockade which leads to irreversible damage to the central nervous system by an accumulation of the side products of the metabolism. Various testing methods are explained. Also information on therapeutic measures in the form of diet are described, as well as a number of difficulties which arise in this area. The disease is described in detail, as well as its most important symptoms (blue eyes, light coloured hair and a very light skin). The causes of the disease, its diagnosis and treatment are also described. The enzyme blockade in the metabolism chain of phenylalanine lead to phenyl ketonuria, thyrosinosis, alkaptonuria and to albinism.

506. WALICKA, T.: Konspekt lekcji z higieny w kl. IX LO. (The outline of a lesson on hygiene in the 9th class of general education secondary school)
Biologia w szkole, 34, 1981, No. 2, pp. 119-120.

The author here deals with a lesson devoted to the topic "Forming Correct Interpersonal Relations". The aim of the lesson is to analyse interpersonal relations and acquaint pupils with the writings of S. Garczyński and H. Seyle. Relations which can develop in a train, tram or among neighbors are discussed and the problem of conflicts and how to deal with them. Pupils learn about strategies which lead to a decrease in tension and anger. In this way they learn to avoid conflicts and stress.

507. WINDELBAND, A.: Zu einigen wesentlichen Bedingungen für den Prozess der Menschwerdung (Concerning some essential conditions for the human phylogeny process)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 82-87.

The article aims at stressing certain aspects of the phylogeny of man, which are taught in the 10th class and which are connected with Engels´ "The Contribution of Labour towards the Humanizing of the Ape". Engels´ conclusions deserve very positive assessment, even if they do contain some "errors", due to the situation in the biological sciences existing in Engels´ time. For this reason it would be damaging to attempt to prove the correctness of Engels´ claims at all costs, especially when they are not in accord with the present state of our knowledge. The author also tires to explain some essential steps in evolution and their importance for the hominisation of the specie. The type of sight which primates have (stereoscopic sight), as well as their five digit extremities and position of the thumb, dentition, erect posture and bipedal walking are all important in this context. Special attention is devoted to social structures and behavioural patterns, since mutations, recombinations and selections do not change only morphological characteristics, but also behaviour. The author ascribes special significance to the qualities of curiosity and imitation. In conclusion various methodological recommendations are made.

508. WUNSCH, C.: Menschen überleben in extremen Kälte. Eskimos-Bewohner der Arktis (Man survives in extremely could temperatures. Eskimos - the inhabitants of the Arctic)
Naturwissenschaft im Unterricht - Biologie, 29, 1981, No. 9, pp. 336-393. 2 worksheets, 1 fig.

The author discusses the possibility of man surviving in the extremely cold climate of the Arctic on the basis of the example of the Eskimos. He refers to various printed information, pictures, worksheets, as well as films on the basis of which the life of the Eskimos is described, their special methods of protection against the Arctic winter, how they hunt, as well as the food they eat(the raw meat of hunted animals because of lack of energy sources). The author also describes their way of life, culture, clothing, weapons, implements and igloos. The provider and source of energy for their life processes is the animal fat they eat in their food.

12.24 Preparations for instruction in general biology

509. ASRIEL, P.: Zum aktuellen Thema (Concerning a current topic)
Biologie in der Schule, 30, 1981, No. 9, p. 386.

The author takes a critical stand towards an article written by Lerchner, published in issue No. 6 of this volume of the journal. The teaching syllabus for the 10th class includes three teaching lessons for Mendel´s laws. Special attention is devoted to combating mystical concepts in genetics. The outcome is that pupils often gain a very simplified form of unterstanding and for this reason the statistical nature of Mendel's laws should be stressed. This can, however, only be done in a biology hobby club, because during normal classwork there is not enough time.

510. BANDOLY, W.: Materialität der Werbungsprozesse: Gedanken zur Entwiclung von Modellvorstellungen in Klasse 12 (The material nature of genetic processes: Suggestions concerning model perciptions in the 12th class)
Biologie in der Schule, 30, 1981, No. 9, pp. 383-384.

The author takes a principle stand on the problem of forming simple, yet realistic perceptions in place of complex model perceptions. Among the important problems in this context is learning about the real structure of cells. Spatial models combined with electron optical photographs are use by the author for this purpose. The material nature of genetic processes can only be explained on the basis of the unity of structure and function of biologically effective macro-molecules. The use of analogies from the technical world is not suitable.

511. CASSUBE, M. - WINDELBAND, A.: Zum aktuellen Thema. Vorschläge zur Förderung schöpferischer Lerntätigkeiten im Stoffgebier "Abstammungslehre" Klasse 10
(Concerning a current topic. Suggestions for supporting creative learning activities in the 10th class in teaching the topic Phylogeny)
Biologie in der Schule, 30, 1981, No. 12, pp. 497-505.

The authors describe empirically verified alternatives of a problem and gnoseologically effective concepts of biology teaching. They stress the need to effectively utilize popular science literature, radio and television broadcasts, etc. For individual topics they cite objectives, teaching media, methods of dealing with problem situations and the solutions, the formulation of hypotheses and their verification.

512. DRANSFELD, K.: Möglichkeiten der modellhaften Veranschaulichung des Allelbegriffs in Klasse 10
(Opportunities for model representation of the notion of allels in the 10th class)
Biologie in der Schule, 30, 1981, No. 7/8, pp. 327-332. 3 figs.

The term allels (or allelomorphs) is a difficult one for pupils to understand. This has a negative effect of understanding Mendel's laws and processes taking place in human genetics.

In contrast to the teaching syllabus, the author is of the opinion that this notion should be introduced on the basis of human genetics (for instance the allels of blood groups, heamoglobin and the enzyme glycoso-6-phosphate dehydrogenase); it should be defined in the following manner: allels are effective forms of genes on the basis of whose information proteins can develop which have various effects or activities. On the basis of examples from human genetics the notion of dominance, recessivity and intermediarity can be explained. The author also discusses the bio-chemical effects of allels, which can be represented as gene mutations and by the use of the term "normal allels" and explaining the practical consequences this has.

513. EVANS, D.: Talking about the gene
The School Science Review, 63, 1981, No. 223, pp. 249-296. 1 fig., 9 lit.

The main problem in teaching genetics is the notion of the gene. This term was introduced into science by the Danish biologist Wilhelm Johannsen in 1909; before this time a number of synonyms were used: Mendel used factor, de Vries pangen, Sutton used the term chromatic entity, etc. In 1920 the term gene became stabilised as the heredity factor. At present, however, three version exist, which concern a definition of a gene. Each new version is the outcome of progress in genetics and the extension of knowledge in this area. The first version is by Mendel, the second version was derived from observations with crossing-over and the third version is, in fact, a bio-chemical interpretation of the gene as apart of the DNA molecule. Now the term cistrone is being introduced to express a gene as a part of a DNA molecule. Hence the term cistrone is a functional unit, while the notion of a gene in Mendel's theory and a gene as a unit of length of chromosome both consider the gene as a hypothetical unit.

514. FLEISCHER, H.: Möglichkeiten zum effektiven Einsatz des Mikroskopierens im Biologieunterricht (Opportunities for the effective utilisation of microscopy in biology instruction)
Biologie in der Schule, 30, 1981, No. 10, pp. 425-433.

Microscopy is one of the methods by which learning can be facilitated in the course of biology instruction. It serves not only for strengthening or confirming what has been learnt theoretically, but also for learning entirely new subject-matter. The author on the basis of the example of the topic "An introduction to cytology" taught in the 7th class, shows how microscopy can be utilised in the most effective manner. For each lesson its objective, the teaching media uses and an analysis of various teaching methods used are provided.

515. GRABY, R.: - KOPPE, U.: Erfahrungen und Vorschläge zur Unterrichtsgestaltung "Genetic" in Klasse 10 (Experiences and suggestions for teaching the topic Genetics in the 10th class)
Biologie in der Schule, 30, 1981, No. 10, pp. 434-435.

The authors praise an article written by Hunneshagen, which was published in issue No. 1 of this journal (this year). In their opinion the subject-matter of genetics his highly motivational and interesting for pupils. They recommend including a discussion in class and a practical excercise to increase pupils' activities. They also cite points of disagreement with the quoted article.

516. HAGEMANN, R.: Zur Behandlung der Genetik im Unterricht (Concerning genetics teaching in school)
Biologie in der Schule, 30, 1981, No. 9, pp. 381-383.

There is a significant difference between teaching classical and molecular genetics and this poses problems for pupils. This difference, which no longer exists in contemporary genetics as a science, arises in the course of instruction due to a formal approach to genetic phenomena and the incorrect organisation of the subject-matter. This can be overcome by using the well-known principle of continuing from the known to the unknown. In the biology textbook for the 10th class this principle has not been adhered to. For this reason the author provides his own procedure which is composed of seven steps and various demonstration models.

517. HORNÍK, F.: Demonstrace Hardy-Weinbergova zákona ve výuce genetiky. (A demonstration of the Hardy-Weinberg law in genetics instruction)
Přírodní vědy ve škole, 32, 1980-1981, No. 3, p. 93.

In populations not undergoing evolution the genetic composition of alternating generations remains the same. The frequency of alleles, as well as genotypes, does not change. A mathematical expression of this equilibrium is the Hardy-Weinberg law, which can be explained in school on the basis of specific examples, the use of which the author of the article recommends.

518. HUNNESHAGEN, H.: Genetik - Erfahrungen und Vorschläge zur Unterrichtsgestaltung in Klasse 10 (Genetics - experiences and suggestions for teaching concepts in the 10th class)
Biologie in der Schule, 30, 1981, No. 6, pp. 227-229.
2 tabs.

The teacher who has written this article has very successfully used a structuralization of the teaching syllabus in class work which differs from the textbook and the methodological handbook. The authors' concept takes into consideration the unity of the logical and the historical in the cognitive process and provides a greater number of opportunities for the active participation of pupils in class work. The subject-matter is divided into 19 lessons, where the 13th lesson is devoted to excercises and the application of acquired knowledge. The author analyses the most important aspects of each lesson.

519. HUNNGESHAGEN, H.: Proteinsynthese - einmal anders (2) (The synthesis of proteins - this time differently (2)) Biologie in der Schule, 30, 1981, No. 30, pp. 420-421.

The author describes her own experiences with genetics teaching. She pays greater attention to genetic information in the course of the bio-synthesis of proteins and the process of decoding information. After a clarification of this process she solves, together with her pupils, the problem of the sequence of amino acids in proteins and the problem of its characteristics.

520. KOPPE, U.: Wie lassen sich schwierige Sachverhalte aus der Genetik anschaulich und fasslich darstellen ? (How can difficult knowledge concerning genetics be represented in an ostensive and understandable manner ?) Biologie in der Schule, 30, 1981, No. 7/8, pp. 325-326. 2 figs.

The primary prerequisite for successful learning is the effective motivation of pupils. This can be achieved for instance by the manner in which the problem is formulated, by the utilization of television broadcasts, etc. For instance the introduction of the term alleles and their difference from genes usually represents a problem. The author describes her own experiences in dealing with this problem. Also to achieve an understanding of protein synthesis often presents a problem. To facilitate this the author uses overhead transparencies with a movable component. He describes in detail the concept of this aid and the material from which it is made.

522. MAJECKA, Z. - NOWAK, L.: Roztwory koloidowe
(Colloidal solutions)
Biologia w szkole, 34, 1981, No. 5, pp. 296-297. 4 tabs., lit. 7.

In the topic "Life at the molecular level", pupils can work on an elective project dealing with colloidal solutions, to which 2 teaching lessons should be devoted. The educational objective of this topic is to acquaint pupils with the characteristics of work influences the logical and independent thinking of pupils. The educational objective of the work is learning about the importance of colloidal solutions in nature and for man. Use is made of foliograms, graphoscopes and various literature. Also observations, experiments and explanations by the teacher are used. The work is carried out according to a plan,papers are presented by pupils, discussions organised and transparencies used. In elective projects, pupils can determine the maximum size of colloidal particles.

Real, colloidal and mixed solutions exist. Colloidal solutions are composed of two phases, the solvent and disperse phase. Colloids can be observed under a microscope because particles larger than 200 microns can be seem under a compound microscope. When ultraviolet light is used, a microscope will show particles sized 100 microns. Brown movement can be observed in colloidal solutions, as well as the Tyndal effect which makes it possible to see the colloidal particles as white dots. Also the filtration properties of colloidal solutions can be studied and the making of a colloidal solutions by the dispersion method (mechanically, with the use of an electrical arch, by chemical dispersion and with the use of ultra-sound), by the condensation method (the forming of sols by decreasing solubility,etc.).

According to the electrical charge of colloidal particles we can distinguish lyophilic, lyophobic, hydrophilic and hydrophobic particles. Colloids can be found in the form of sols and gels and is a water phase as hydrosol and hydrogel. Decreasing the number of colloidal particles is called coagulation. In coagulation the colloidal particles drop out of a solution. The transition of a gel into a sol is called peptisation. We can distinguish reversible and irreversible colloids. Colloids are a component of plant cells and animal cells, typical colloids form the cytoplasma of cells; in colloids the most important living processes take place. Numerous colloidal solutions are found in the soil, where the are decisive for the nutrient values of the soil. The more there are of them in the soil, the more nutrients the soil can hold. The second topic with which the author deals is the preparation of colloidal solutions; he recommends devoting two teaching lessons to this purpose. The educational objective is to acquaint pupils with the making of colloidal solutions, where the pupils learn about the characteristics of colloids and about changes which take place in colloids in the presence of alcohol and various acids; experiments concern the permeability of colloids through various membranes. The findings of the observations and experiments are in conclusion summed up in tables.

522. MATZKE, M.: Zur erkenntnisprozessgerechten Behandlung genetischer Inhalte im Unterricht (Concerning the gnoseologically adequate teaching of genetic problems in instruction)
Biologie in der Schule, 30, 1981, No. 10, pp. 422-425.

If the teaching of genetics is to be successful, some recommendations should be honoured. The cognitive process should be facilitated by teaching media. Pupils should acquire correct notions concerning genetics. Proceeding from the specific to the abstract and being able to express the abstract is made easier by teaching media. In the teaching of genetics, synthesis predominates, where we proceed from the abstract to the specific. These aspects of the problem of teaching are made concrete on the basis of the example of identical replication and the implementation of genetic information. In conclusion the author points to the worldview aspects of genetics subject-matter.

523. SKIBBE, H.: Vorschläge zur Nutzung von Vorleistungen für das Stoffgebiet "Abstammungslehre" (Suggestions for utilizing preliminary knowledge in the topic Phylogeny) Biologie in der Schule, 30, 1981, No. 2/3, pp. 90-92.

A prerequisite for understanding evolutionary processes is learning genetics. Pupils should understand which genetical mechanisms determine the forming of specie-specific characteristics and how new genetic qualities develop. The author discusses his own experiences in this area gained in the implementation of these educational and teaching objectives. In teaching genetics he constantly returns to the problem of skin pigmentation caused by melanine, which he explains in detail. For extending knowledge concerning evolutionary processes he makes use of the preliminary knowledge gained by pupils concerning population waves, the characteristics of the red fox, the Arctic fox and the Fennec, as well as a comparison of various types of eyes.

524. WILSON, E.O. - BOSSERT, W.H.: Populáció biológia (Population biology)
A biologia tanítasa, 20, 1981, No. 4, p. 123.

A very brief review of a book by two world-famous professors from Harvard University in the USA; the author of the review recommends the Hungarian translation of their book above all to teachers, but also to pupils in the upper classes of secondary school and students at institutions of higher learning. The review also stresses that by the publication of the Hungarian translation an evident gap in the available literature has been filled in. The book deals with the mutually interconnected areas of genetics, sociology, evolution, ecology and bio-geography and also acquaints the reader with the special mathematical aspects of biological models.

525. PRANTL, J.: Das aktuelle Unterrichtsziel - Separation (Current aims of instruction - Separation)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 11, pp. 343-345. 2 transparencies.

The author deals with the teaching and explanations of two terms - separation and isolation. Separation either decreases or entirely prevents the exchange of genes between two partial populations. A part of the total population can than procedd in an entirely independent evolution. In the long-term this can lead to the development of new races or even new species. Separation is a factor of evolution. On the other hand isolation is a factor which in various ways prevents the mixing of two different gene pools. It usually makes itself felt when two different gene pools represent the genes of two true species. The author cites examples on the basis of examples from the Indonesian archipelago and the Galapagos Island. He shows the development of separation barriers and provides suggestions for the making of suitable transparencies for use in class.

13. The outcome of biology instruction

526. ESCHENHAGEN, D. - LÄNGESFELD, V.: *Biologie in der Grundschule im Lichte der Aussagen von Schülern des 5. Schuljahres* (Biology in basic school on the basis of the responses of pupils in the 5th class) Naturwissenschaften im Unterricht, 29, 1981, No. 3, pp. 71-77.

The article presents findings of a project where pupils of the basic school in Wardenburg near Oldenburg in 1980 from the 5th class were asked to fill in questionnaire. The project included 219 pupils. The findings were compared with a similar project undertaken 11 years ago (230 pupils at a school in Göttingen). A confrontation between findings from 1969 and 1980 and the discussion concerning the differences indicates that instruction in basic school is now influenced among others by the general instructions for basic schools in Lower Saxony issued in 1975 which concerned the teaching of biology within the framework of the teaching subject called Factual Instruction. The outcome is shown to be positive, but at present pupils participate in fewer excursions to forests and fields. The questionnaire also concerned pets and other animals kept at home, favorite animals, participation in excursions, collecting natural objects and their identification and classification, the use of a magnifying glass, bioculars, the observation of stuffed animals in school, care of plants in school, the observation of flora and fauna during school excursions, visits to the zoo, the use of films in school, listening to school radio broadcasts, the drawing and writing of reports on factual instruction, the use of aquariums and terrariums in school, dealing with environmental problems in the course of school instruction and learning about individual plants and animals in class work.

13.1 Verification of results achieved in biology instruction, repetitions, strengthening, systemization and structuralization of subject-matter, surveys of subject-matter

527. GOCKERT, G.: Erfahrungen bei der Arbeit mit Analysen von Klassenarbeiten (Experiences with analyses of written examinations)
Biologie in der Schule, 30, 1981, No. 1, pp. 21-23.
1 fig.

The author first discusses the significance of analysing work done by pupils; in this way he obtains an overview of the most important mistakes and errors made by pupils and their shortcomings. In this work it is necessary to gain an idea of the work done by individual pupils, not just the class as a whole. For this purpose the author gives his pupils tests, which are done on a sheets of paper size A4. Pupils who are unable to solve all the assignments recieve homework consisting of a repetition of the subject-matter in question. Experiences has indicated that pupils rapidly became used to this form of testing and that it is quite possible to compare the outcome of written and oral examinations.

528. HENDRIK - MERTENS - BAUMGARTNER: Individualizing Instruction Through Concept Assessment
The American Biology Teacher, 43, 1981, No. 5, pp. 246--253, 5 tabs.

Biology and bio-ethics have become the subject of newspaper editorials and the writing of various journals and magazines. The mass media often use incorrect terminology, which then penetrates even professional journals and also make its way into the classroom. Lack of unity and the ambiguity of terms has become the reason for a secondary school project to determine how students understand these terms. The authors describe the project and the resulting concepts of various terms are summed up into tables, which distinguish genetic terms according to Mendel, terms borrowed from philosophy and ethics, physiological terms concerning reproduction and terms describing human behaviour. The outcome of the project was the disconcerting finding that a high percentage of the respondents were not properly acquainted with these terms.

529. RUMELHARD, G.: Représentations et concepts
(Representations and concepts)
Biologie-Géologie, 68, 1981, No. 1, pp. 127-135.

The author discusses problems which were the subject of research projects concerning science education. They included the problem of instruction and the latest scientifing theories, methods used in making scientific findings available to students, etc. He cites examples from his own experiences, as well as the opinions of foremost educators (Claparède, etc.) and natural scientists. He stresses the need to study the history of the natural sciences, as well as educational theory.

530. WELCH, W.W. et al.: The Role of Inquiry in Science Education: Analysis and Recommendations
Science Education, 65, 1981, No. 1, pp. 34-50. 1 tab.

An inquiry is a process in which information is gained. In a broader sense, an inquiry reflects a way of thinking. Scientific inquiry is part of a broader inquiry as such, aimed at nature and it is based on specific opinions and assumptions. Because the ability to carry out inquiries is one of the objectives of instruction in the natural sciences, this problem is naturally of interest to scientists. The authors in this article enumerate their findings, based on projects carried out in various schools and they make comparisons between the situation as it exists and what they think it should be: they come to the conclusion that teachers are insufficiently trained to teach students to carry out inquiries.

13.2 Assessment of results achieved in biology instruction

531. MYAGKOVA, A.N. - RUMYANTSEVA, M.N.: Kak otsenivat znaniya i umeniya uchashchikhsay po biologii (How to assess the knowledge and skills of pupils in biology)
Biologiya v shkole, 55, 1981, No. 5, pp. 3P 30-35.

The new section of the teaching syllabus entitled "Recommendations for the marking of pupils: helps to increase the objective nature of a teacher' assessment, to overcome formalism in this area and to improve the quality of pupils' knowledge and skills. The authors deal in detail with examples of specific answers given by pupils concerning some topics, also in relations to the need of forming in pupils required skills.

13.3 School-leaving examinations in biology

532. Baccalauréat de technicien - Sciences médico-sociales (School-leaving examinations in technical schools in the medical and social sciences)
Biologie-géologie, 68, 1981, No. 4, pp. 903-966. 50 figs.

The article provides a documented survey of school-leaving examination questions in the natural sciences and in chemistry. The questions which the examinee is to answer are developed in detail and accompanied by pictures, to which the examinee is to provide explanations. Specific questions concerning biology and chemistry are found in a single examination which takes 4 hours: 2.5 hours are devoted to biology and 1.5 hours to chemistry. The examination is in writing and also the comments to the pictures must be made in writing.

533. DAŻ, T.: Jak prowadzę prace maturalne (How I deal with school-leaving examinations)
Biologia w szkole, 34, 1981, No. 5, pp. 294-295.

The school-leaving examination is the culmination of work in secondary school, where the pupil demonstrates his knowledge and skills, as well as the pedagogical expertise of his teacher. Since the 1st class of secondary school the special interests of pupils studying the biology and chemistry stream are taken into account. Pupils carry out various observations, experiments, they cultivate plants, breed animals and thus learn basic biological techniques, which can be made use of in the course of the school-leaving examination. The pupils recieve the subject-matter of the school-leaving examinations already in the 3rd class of general education secondary school. They are also acquainted with the methods of scientific work, how to look for literature and basic information, how to chose a suitable scientific method and how to deal with the problem in the assignment. Also such problems as the formal aspects of a science report, the formulation of conclusion and the preparation of a bibliography are given attention. The author cites the example of a school-leaving examination project concerning the topic "The influence of growth chemical substances on the growth and period of blooming of the geranium (Pelargonium hederaefolium)".

534. HOCKE, C.: Schlussfolgerungen aus den Ergebnissen der schriftlichen Reifeprüfung des Schuljahres 1979/1980. (Conclusions drawn from the outcome of the written school-leaving examinations in the school year 1979/1980). Biologie in der Schule, 30, 1981, No. 2/3, pp. 92-97.

Problems have appeared, especially in the application of physics and chemistry knowledge in biology and in the application of biological knowledge when dealing with the problems of society. Pupils had difficulties in carrying out more demanding activities, such as for instance an assessment of graphical relations, drawing, the formulation of a hypothesis and planning an experiment. An analysis of the school-leaving examinations of 199 pupils of general education secondary schools in 5 different regions concentrated on the following: a knowledge of essential terms, processes and phenomena, the application of biological knowledge and the degree of having mastered mental and practical skills in learning and applying biological knowledge and the worldview assessment of biological phenomena and knowledge. Individual aspects of the analysis are described in detail, as well as the conclusions made on the basis of this analysis.

535. LIEB, E.: Biologieunterricht und formale Bildung. Lassen sich die Anforderung von Klausuraufgaben und dem Biologieunterricht der Leistungskurse mit den Anforderungen in anderen Fächern vergleichen ? (Biology instruction and a formal education. Can the demands made upon written school-leaving examinations in the final class of secondary school, as far as biology is concerned, be compared with the demands made in other teaching subjects ?)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 5, pp. 129-134. 2 figs., 1 tab.

The author provides comments on the problem of written school-leaving examinations. The project dealt with in the examination is done within the framework of instruction in the final class of general education secondary school in the concluding months. The topics are provided by the Ministry of Education and by special published standards. An analysis of the examinations in various subjects indicates that these standards and instructions are too general to be able to provide a comparison between various subjects and to assess them as far as their content and quality are concerned.

13.4 The outcome of biological competitions

536. ZABEL, E. - HEINZEL, I.: Ernst Haeckel-Schüler-Preis 1981 (The Ernst Haeckel Prize for Pupils, 1981)
Biologie in der Schule, 30, 1981, No. 11, pp. 482-483. 1 fig.

40 pupils from 11 schools participated in the finals of the competition. A positive aspect of the competition is the fact that a pupil's work is based

on his own iniciative and that a number of the findings entered into the competition were the outcome of two or more years of observations. The author provides a survey of winners and the subject of their work.

14. The biology teacher

537. BETKOUSKI, M.: On Making Stress Work: Strategies for Coping
The Science Teacher, 48, 1981, No. 3, pp. 35-37. 3 figs., 1 tab.

Teachers often succumb to stress, just as people in other professions, where individuals are responsible for the intellect and emotional development of others. Overwork, exhaustion and a feeling of responsability tend to make a bigger impact upon the nervous systems of teachers than is the case of other professionals. Psychologists and psychiatrists have studied way of protection against these negative influences in the course of work. The author of the article here provides the findings of a recent study on this topic which can be helpful to all teachers, but especially biology teachers.

538. HAVLÁKOVÁ, [illegible].: Práce učitele přírodopisu na naší škole (The work of a science teacher in our school.)
Přírodní vědy ve škole, 32, 1980/1981, No. 6, pp. 206-207.

The basic criterion of the quality of a teaching lesson is the functionality of the use made of media in fulfilling the educational and teaching objective of the lesson. The science teacher has more work with the preparation of the teaching lesson, since he must prepare natural specimens, begin longterm experiments, devote attention to the plants and animals cultivated in the school, etc. The author provides instructions for forming herbalized collections of plants, which can then be used for pupil assignments. Making and maintaining collections of animal specimens is much more difficult and time consuming. Small animals can be kept in formaline in pill bottles. The author also provides information on other animals (for instance Hydra grisea and paramiceum).

539. KAHLE, J.B. - YAGER, R.R.: Current Indicators for the Discipline of Science Education
Science Education, 65, 1981, No. 1, pp. 25-31.

Several conferences have been held for the representatives of various schools concerning the critical situation in science teaching. On the basis of the papers presented to such conferences, the authors have developed 8 basic indicators which are crucial for science teaching. Among the indicators which the discussion centered on were the following: the science teacher as the key to improving instruction. All the indicators are discussed and commented on in the article and the opinions of over 200 teachers at various types of schools are summed up.

540. KOTALOVÁ, B.: K druhému ročníku přípravy učitelů přírodopisu (Concerning the second year course of science teacher training)
Přírodní vědy ve škole, 32, 1980/1981, No. 2, pp. 51-52.

The new teaching syllabus for the 6th class of basic school is conceived in a developmental manner: ecological and ethological aspects predominate. For this reason also teacher training requires acquainting students with the newest findings in the phylogeny of animal ecology and ethology. The author cites a bibliography of literature on the subject. The most difficult part of the course is the topic "The methodology of practical assignments" in view of the large number of participants.

541. WHITNEY, L.J.: Biology Teachers and Peace
The American Biology Teacher, 43, 1981, No. 9, pp. 502-505. 2 figs.

A biologist analyses the present political situation in the world and provides an outline of how biology teachers should influence their students and explain to them the biological necessity of disarmaments and peace. He recalls the destruction of Hiroshima and Nagasaki and the development of new nuclear weapons which in several moments can change the whole world into a desert. He rejects the neutron bomb and reminds readers of Darwin's opinion concerning the struggle for life. The example of Albert Schweizer, who devoted his whole life and his knowledge as a physician and scholar to the struggle for the lives of the most down-trodden is cited as an example to follow. The article contains numerous interesting quotations from the works of Darwin and Schweizer.

14.2 Teacher training in normal, inservice and post--graduate study courses at pedagogical and natural science faculties.

542. CIEŚLIŃSKI, S. - MAJECKA, Z.: O przygotowaniu do zawodu nauczycielskiego (On training for the teaching profession)
Biologia w szkole, 34, 1981, No. 2, pp. 80-82. 1 tab.

The development of biology as a science requires the modernization of its teaching syllabus and the updating of textbooks, as well as improved laboratory and technical skills which pupils learn, the more extensive use of experiments and observations, used of original objects, cultivation of plants and breeding of animals and more extensive knowledge of agricultural and zootechnical skills. The authors provide information about changes in this direction in teacher training at the Pedagogical Faculty of Warsaw University. In the most recent three years questionnaire projects have been carried out with the graduates of teacher training courses. The graduates were asked about their practical skills, knowledge of microscopy techniques, skills in making microscopy specimens, the cultivation of plants, etc. The respondents indicated that most schools have insufficient school experimental plots of land and that pupils have insufficient preliminary knowledge about basic plants and animals. The authors sum up their findings in tables.

543. KOROTKOVA, L.S.: Primetniy uchebno-tematicheskiy plan i programmy razdela "Teoria i metodika prepodavaniya biologii" kursov povisheniya kvalifikatsii uchiteley vosmiletnikh a srednikh shkol (A model subject-matter plan and syllabus for the section "The theory and methodology of biology instruction" in courses for increasing the qualification of teachers in eight-year and in secondary schools).
Biologiya v shkole, 55, 1981, No. 5, pp. 46-58.

The courses for increasing qualification have a total of 156 hours; of this number 80 hours are devoted to the theory of biology instruction. The article describes the courses in detail, their syllabi, the assignments given to students and provides a bibliography.

544. SCHELLHORN, M.: Zur Einheit des Logischen und Historischen in der Ausbildung von Lehrern für den mathematischen, naturwissenschaftlichen und polytechnischen Unterricht (Towards a unity of the logical and the historical in teacher training for mathematical, science and polytechnical subjects)
Biologie in der Schule, 30, 1981, No. 6, pp. 246-247.

Within the framework of a conference of institutions of higher learning held in Güstrow on October 10th to 17th, one conference section was devoted to the philosophical problems of the natural sciences. The author sums up the most important papers heard at the conference and briefly describes individual papers.

14.3 Public activities undertaken by teachers, work in district pedagogical societies and in regional pedagogical societies, biology supervisors, visits to class by supervisors

545. SCHÜRER, R.: Aus der Arbeit der Fachkommission Biologie des Kreises Schwarzenberg (Concerning the work done by the biology teaching-subject committee in the Schwarzenberg district)
Biologie in der Schule, 30, 1981, No. 4, pp. 170-171.

Within the framework of the further education of teachers, eight teachers from the district participated in a course which was held in the Müritshof nature conservation area. The purpose of the course was to extend teachers' knowledge concerning the professional, methodological, political and ideological aspects of nature conservation. The author describes the content of various lectures and provides some organisational information.

14.7 Meetings, conferences and congresses concerning biology

546. CICHY, D.: Zajęcia fakultatywne przedmiotem narady dydaktykow biologii (Elective school work - the subject of a meeting of educators)
Biologia w szkole, 34, 1981, No. 5, pp. 306-307.

In many educational and teaching systems great importance is attached to elective work concerning some scientific discipline taught in school. Elective work is very important for the forming of attitudes in pupils and for their education. In the GDR the 18th Congress on School Biology held in May 1981 in Güstrow was devoted to elective work by pupils in biology. The main subject of the Congress, in which many guests from the socialist as well as capitalist countries participated, was elective work and in its importance in forming the personality of the pupil. The main paper was presented by prof. Zabel who dealt with the specific characteristics of elective work in schools in the G.D.R. and the influence of this work on a pupil's personality. Prof. W. Stawinski spoke about elective work in schools in Poland. The Congress also held sessions in three sections, which dealt with the function of didactics in elective school work, with zoological work and the forming of science trails in elective courses and finally with the breeding of animals as objects of observation and excercises as elective work in biology. The development of nature conservation and elective biology work in Czechoslovakia was also spoken about.

547. FANDREY, K.: Tagung der Gesellschaft für Humangenetik der DDR "Praxis der Humangenetik" (A conference of the Society for Human Genetics of the G.D.R. on the topic practical human genetics)
Biologie in der Schule, 30, 1981, No. 7/8, pp. 342-343.

The Society was founded on November 27, 1978 in Gera as an affiliate of the Society for Experimental Medicine. Its first meeting with international participation was held on November 9th to 13th 1980 in Neubrandenburg. Besides specialists from the G.D.R., also scientists from the USSR, Poland, Hungary, Czechoslovakia, FRG, Switzerland and France participated. Papers presented concerred genetic counselling, cytogenetics and biochemical diagnostics. The article deals briefly with some of these papers.

548. GENLHAAR, K.H.: Neuwahl der Leitung der Sektion Schulbiologie (The election of a new committee of the Section for School Biology)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 107-108.

The election was carried out at the occasion of the XVIIth Conference on School Biology which was held in Rostock. The conference assessed in a positive manner the activities of the Section on School Biology which is important both for the theory and practice of teaching. Cooperation with Czechoslovakia and Poland was also assessed positively. The new committee continues to have 16 members and prof. Zabel from Güstrow continues to be its chairman. His deputies are prof. Baer and prof. Müller.

549. HEINZEL, I.: Vorankündigung XIX. Schulbiologietage 1982 von 8. bis 11. Mai in Mühlhausen Tomas-Müntzer--Stadt. (Preliminary information on the XIXth Congress on School Biology 1982, to be held on May 8th to 11th, in Mühlhausen)
Biologie in der Schule, 30, 1981, No. 9, pp. 390-391.

The main topic of the Congress will be the educationally effective teaching of biology. The congress should contribute to determining the educational objectives of schools and to a clarification of the contribution made by biology teaching towards fulfilling educational objectives; it will also contribute to determining the knowledge which is necessary for achieving a good education and to the discussion on the specific aspects of educational work. Besides the papers planned, also three sections will meet to discuss various problems.

550. HORNÍK, F.: Symposium k didaktice biologie
(A symposium on the didactics of biology)
Přírodní vědy ve škole, 32, 1980/1981, No. 8, p. 290.

On October 26th to 30th, 1980 the 1st Symposium on the Didactics of Biology was held in Greifswald in the G.D.R. The main topic of the meeting was the subject-matter of the didactics of biology and the tasks ahead in the further development of its theoretical foundations.

551. KLEINE, U.: Ansätze zur Förderung der Bürgerbeteiligung an städtischen Umwelterziehungsprojekten
(Initiative concerning the requirement of civic cooperation in municipal projects for education towards environmental conservation)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 3, pp. 91-93.

The author provides information on a conference held by the European Council for the Environment, which was held from September 30th to October 6th 1979 in the Hague. The agenda dealt with special educational methodologies concerning environmental conservation in an urban environment, opportunities for improving the quality of life in urban areas, in relation to improved contacts between people and nature and problems of how to maintain, develop and improve natural biotas in the vicinity of cities. Participants were also interested in visits organized to local farms which since 1919 are maintained for teaching purposes in the vicinity of the Hague, for the needs of school children. These farms have their own staff of teachers, gardners and those caring for animals; they make it possible for urban children to have contacts with a farm. They are administered as educational institutions. Each of these farms has 3000 to 4000 m^2 of land.

552. KOT, W.: Konferencja nauczycieli biologii szkól dla pracujących (A conference of biology teachers who teach at adult-education schools)
Biologia w szkole, 34, 1981, No. 5, pp. 307-309.

On May 27th to 30th 1981 the Centre for the Further Education of Teachers organized a conference at Novi Sącz for biology teacher in adult education schools. Also supervisors and specialists in methodology of biology teaching participated. The conference was held under the auspices of the Ministry of Education, in cooperation with the Institute for the Further Education of Teachers, the Institute for Adult Education and the Institute for School Curricula and Syllabi. The objective of the conference was to improve and modernize organizational forms and methods used in biology teaching and in educational work in adult education schools. The main papers presented concerned problems of the further education of teachers in Poland, the new biology syllabi and the hygiene syllabus. The structure and content of teacher training, the structure and function of the didactics of biology, biology television courses for adult education secondary schools, an analysis of radio programs for adult education and the use of visual aids in teaching were also discussed. A new biology syllabus for adult education biology courses was introduced at the conference, where in the first 4 semesters biology is taught 2 hours a week, i.e. a total of 156 lessons. In inservice (extra-mural) courses this number is equal to only 72 lessons. The inservice training course is taught every alternate Saturday and Sunday (i.e. 18 hours per semester). The curriculum includes genetics, evolution, ecology, environmental conservation, hygiene and the prevention of disease.

553. MLADÁ, J.: Pedagogická komise Čs. botanické společnosti (The educational commission of the Czechoslovak Botanical Society)
Přírodní vědy ve škole, 32, 1980/1981, No. 7, pp. 250-251.

In February 1980 an educational commission of the Czechoslovak Botanical Society of the Czechoslovak Academy of Sciences was founded. The most important part of its activities will concern botany teaching in all types of schools. The meeting heard reviews of textbooks and other books published by the State Pedagogical Publishers in Prague. Also a questionnaire project was organized to determine the opinions and ideas of educators concerning improvements in botany teaching. On the basis of the questionnaire project the conclusion was arrived at that more single-topic excursions should be organized and worksheets for use during these excursions should be published. At present the pedagogical commission of the Czechoslovak Botanical Society is developing experimental work in single-topic excursions and for this purpose has already published two methodological sheets concerning protected plants.

554. NIEMERKO, M.: Seminarium radio i telewizja w szkole (A seminar on the use of radio and television in school)
Biologia w szkole, 34, 1981, No. 5, pp. 309-310.

On June 1-3, 1981 at Piotrokowie Trybunalskim a seminar was organized by the Ministry of Education and the editors of the Educational Section of Polish Radio and Television, which was devoted to the problem of the use of radio and television programs in school. The objective of the conference was to solve some of the problems connected with educational and teaching programs. The director of the Institute for School Curricoula and Syllabi, S. Frycie spoke about the place of radio and television programs in the school curriculum, E. Marciukowska spoke about the use of school radio systems for making up their own programs, while Z. Ostas spoke about the use of television programs. D. Cichy spoke about the utilization of TV programs in biology instruction. A number of other papers also dealt with radio and TV programs in relation to biology teaching. The program of radio and television broadcasts for school purposes for the period 1980-1981 was discussed.

555. PIOTROWICZ, M.: Sprawozdanie z IV krojowej konferenji dydaktyków biologii szkól wyżsych w Lublinie (Report on the 4th regional conference of specialists in the didactics of biology at institutions of higher learning in Lublin)
Biologia w szkole, 34, 1981, No. 1, pp. 56-57.

In 1970 the didactics of biology were introduced into the curriculum at teacher training institutions. This is an integrated subject, which makes use of biology, pedagogics, general didactics and psychology. It has an extensive teaching syllabus. The didactics of biology acquaint students with the theoretical foundations of the didactics of biology and prepares them for teaching biology in schools: it also provides basic information on the rationalization of biology teaching in schools, how biology should be taught, how to develop pupils' skills, as well as the newest teaching media and aids and how they should be utilised. The article also provides detailed information on the All-Polish Conference of Specialists in the Didactics of Biology which was held in Lublin on September 15th to 17th, 1980. Besides educators from institutions of higher learning from Poland also guests from the G.D.R., FRG and the staff of radio and television were present. The subject-matter of the conference were problems connected with the implementation of the new curriculum and biology teaching syllabi in schools and the use of equippment and technical media in implementing the syllabi. Papers were also presented on cooperation between botanists and educators in solving problems connected with teacher training. Other papers concerned the following topics: The teaching and educational process in connection with teacher training; the existing situation and outlooks for the development of the didactics of biology; criteria for a classification of teaching objectives; the structuralisation of the didactics of biology; making use of the correlation between psychology and the didactics of biology in training teachers for biology teaching; main trends in the development of the didactics of biology in the FRG; doctoral work in the didactics of biology; observations as a method of biological research and its use in teaching; the utilisation of the environment in biology teaching.

556. SIEGEMUND, F.: Tagung der Sektion Genetik der Biologischen Gesellschaft (A meeting of the Genetics Section of the Biological Society)
Biologie in der Schule, 30, 1981, No. 6, pp. 245-246.

On October 24th to 25th in Halle the Genetics Section met together with the Section for School Biology. The subjects discussed at the meeting concerned experiments in genetics in the framework of biology instruction. Three papers concentrated on experiments in genetics research, while shorter papers concerned genetic experiments which can be used both in mandatory and elective biology courses and in hobby club extra-curricula activities. The author provides information on individual papers presented.

557. VOESACK, L.: Information über die wissenschaftliche Jahrestagung der Biologiemethodiker der DDR

(Information on a scientific meeting of specialists in biology methodologies in the G.D.R.)
Biologie in der Schule, 30, 1981, No. 11, p. 484

The subject of the meeting was a paper entitled "New research findings concerning the didactics of biology in the G.D.R"; the meeting was held on December 16th and 17th 1980 in Leipzig. The objective of the meeting was to assess the results achieved in the last five years. The author acquaints readers with the content of 11 selected papers.

558. WINDELBAND, A.: Internationale Tagung zu Problemen der Menschwerdung (An international meeting concerning problems of human anthropogeny)
Biologie in der Schule, 30, 1981, No. 12, p. 527.

The meeting was held on May 18th to 22nd 1981 in Weimar and concerned the topic "Anthropo-socio-geny - the Biotic and Social Development of Mankind". 90 specialists from various fields participated. The author provides information on 42 of the papers presented.

559. ZABEL, E. - EISENHABER, P.: XVIII. Schulbiologietage vom 9. - 12. Mai 1981 in Güstrow (The XVIII School Biology Congress held on May 9th to 12th, 1981 in Güstrow)
Biologie in der Schule, 30, 1981, No. 11, pp. 478-481.

The topic of this conference was "The contribution of hobby clubs and elective courses in biology to the development of a socialist personality". 340 specialists participated, 25 of them from the socialist countries, including the USSR, Poland, Bulgaria, Hungary and Czechoslovakia. 10 papers were presented in the plenary session and 49 papers were presented in 4 sections. The content of individual papers is cited in the form of brief annotations.

560. ZABEL, E.: Zur Konferenz über Methoden und Verfahren der Erkenntnisgewinnung im fakultativen Biologieunterricht (A conference on the methods and procedures used in gaining knowledge in elective biology courses) Biologie in der Schule, 1981, No. 2/3, pp. 108-109.

During the 5th Conference of Institutions of Higher Learning, which was held on October 14th to 16th 1980 in Güstrow, a special session was held concerning the relation between mandatory and elective courses in basic school and in general education secondary school. Within this session, seperate sections met for individual teaching-subjects, among them school biology. The discussion centred on methods of teaching in elective courses. 56 specialists in the didactics of biology participated; the author describes briefly the various papers which were presented.

14.9 Outstanding biology teachers, anniversaries, deaths

561. WILARSKI, W.: Prof. Dr. hab. Andrzej Jasiński Biologia w szkole, 34, 1981, No. 1, pp. 3-4.

Prof. Jasiński died on November 11th 1980 in Krakow. He was a professor at the Jagellonian University, a member of the zoology committee of the Polish Academy of Sciences, a member of the Academy, a member of the editorial board of Acta Biologica Cracoviensia and the journal Biologia w szkole, a member of the Council for

Biology and Hygiene Syllabi of the Ministry of Education and the author of numerous textbooks. He received several awards for his outstanding work. He was a specialist in neuro-secretion of poikilothermous vertebrates. As a university professor he made an important contribution to the development of new curricula and syllabi for general education secondary schools, new textbooks for these schools and methodological handbooks for teachers at these schools. He was also a great populariser of zoology. Polish zoology and didactics have lost an outstanding person.

562. LEPS, G.: Professor Hermann Ley sum 70. Geburtstage (At the occasion of prof. Ley's 70 th birthday) Biologie in der Schule, 30, 1981, No. 11, pp. 491-492. 1 fig.

The name of prof. Ley is connected with an important stage of development of Marx-Leninist philosophy and pedagogy. Since 1948 he worked at the University of Leipsig in the field of education and later as a professor of historical and dialectical materialism. Since 1956 he was chief of the Department for the philosophical problems of modern natural sciences at the Humboldt University in Berlin.

563. MEISSNER, K.: Dr. rer. nat. Otto Jessen Biologie in der Schule, 30, 1981, No. 12, p. 540. 1 fig.

On August 4th 1981 Dr. O. Jessen died at the age of 65. He worked for over 30 years at the Pedagogical Faculty in Güstrow where he specialized in the fields of zoology and animal physiology. He was also interested in the study of plants, insects, molluscs and the parasites of fish.

564. PODSTOLSKA, M.: Dobre wzorce (Good models)
Biologia w szkole, 24, 1981, No. 2, pp. 126-127, 1 photo.

The author, who is on the editorial board of the journal, informs readers of her interview with Dr. J. Szczepanek, a teacher at the 1st general education secondary school in Nowi Sącz, who is an excellent teacher and organizer of biology olympiads and other biology competitions for pupils. Since 1974 she has led 58 of her pupils through the finals of the Biology Olympiad. She has recieved several rewards. In the interview she explained the essence of her success in good organizational work, modern equippment in the biology classroom, a willingness to work hard and the use of an individual approach to pupils.

15. Articles with information concerning scientific biology

565. ALTMANN, A.: Vývoj a perspektívy biologického boje proti škůdcům kulturních rostlin (The development of biological forms of combating crop pests)
Přírodní vědy ve škole, 32, 1980/1981, No. 8, pp. 290-291.

The negative consequences of chemically combating pests and diseases of crops have led to endeavours to use biological forms. Biological forms of combating pests make use of insectivorous birds, predator insects and parasites of the crop pests, as well as pathogens of insect pests. There are approximately 300 species of viruses which attack insect pests. The article is written according to an article of the same name published in a Polish journal.

566. TSANEV, R.: Molekulyarnata biologiya - strategichesko naparvleniye (Molecular biology - its strategic trends)
Biologiya i khimiya, 24, 1981, No. 1, pp. 4-8.

The Bulgarian Institute for Molecular Biology, previously called the Institute for Bio-chemistry, has begun to do important theoretical research concerning the properties of high molecular substances and their use in agriculture and medicine. Special attention is devoted to a clarification of the structure of proteins and nucleic acids, as well as the mechanism for the transmission of genetic information and the synthesis of proteins. It has been found that at present molecular biology is a field upon which the success of other biological disciplines increasingly depends and that the development of this field is in turn dependent upon practical work.

567. CARNEY, G.C.: The Measurement of Primary Production in Pond Phytoplankton Using the Carbon-14 Technique
Journal of Biological Education, 15, 1981, No. 1, pp. 31-34. 1 fig., 1 tab.

The measurement of the primary production of phytoplankton using the Carbon-14 method is directly connected with the fact that CO_2 thickens in microscopical organisms. The intensity of this process makes it possible to obtain important data throughout the year on the basis of water samples, which appear to be crystal clear with the naked eye. The author provides a detailed description of these measurements and the procedures which should be carried out to prevent health hazards. A table and diagram provide illustrations of the outcome of these measurements.

568. DENISIUK, Z.: Pustynia jako ekosystém (The desert as an eco-system)
Biologia w szkole, 34, 1981, No. 5, pp. 259-268. 3 photos, lit. 18.

The desert represents an important eco-system, just as the steppe or forest does. Deserts are not devoid of all life, the majority have rich flora and fauna, especially during the period of rains. Deserts can be found in all climates, with the exception of the Polar regions. Deserts can be divided into exceptionally arid ones (under 250 mm of rainfall), and semi-arid areas (under 450 mm of rain), which represent a transition to the steppe. Arid areas take up approximately 500 million km^2, i.e. 35 % of the Earth's surface. The largest areas of desert are on the Euroasian continent, Africa and then Autralia. On the Arab peninsula deserts represent 95 % of the land, in Pakistan 88 %, in Central Asia 55 %, in Australia 45 %, in South America 10 % and in North America 8 %. The most arid continent as a whole is Australia (45 % of its area), then Africa (33%) and Asia (32 %). The deserts of Asia and Africa form a continuous band of an east-west direction which is almost 110 000 km long. Deserts can be found in the lowlands and mountainous areas. The lowest are the deserts of Asian Middle East, while the highest are in central Asia (900 - 2600 meters above sea level). The Sahara itself takes up 7 million square kilometers. The aridity of a desert does not depend on its distance from the sea or ocean shore. Deserts, like other eco-systems, include 4 basic components, the non-living substance of the environment, producers (green plants) consumers (heterotrophic organisms) and destructors (or reducers). Some eco-systems are complete and contain all the cited components, while others are incomplete and some component may be lacking. The limiting factor to life in the desert is water, temperature and the salinity of the soil. According to the temperature we can distinguish hot deserts (in the tropics and sub-tropics) and cold ones (in the temperate zone). Cold deserts are richer in both flora and fauna. The productivity of deserts is low, only 1200-2500 kg of biomass per hectar of land annually, i. e. 0.5 % g of mass per 1 m^2 per day. Arid savanahs produce 7300 kg/ha, arid temperate savanahs 12 000 kg, the temperate arid steppe 11 200 kg/ha, subtropical forests 24 500 kg/ha, and equatorial forests 32 500 kg/ha. Deserts have attracted an increasing interest in them because of their mineral resources, especially petroleum. The article deals in detail with the flora and fauna found in deserts.

569. DUSSART, G.B.J.: A Key to Statistical Methods for Biologists

The School Science Review, 62, 1981, No. 220, pp. 476-489. 2 tabs., 6 figs., lit. 10.

Exact biology research requires the use of varied statistical methods, which may differ greatly from case to case. Various statistical methods are applicable only to specific problems. The author, in an unusual summary in the form of a key, describes various methods applicable to biology, which he explains in detail and illustrates with examples. The key includes for instance probability theory, the zero hypothesis, information retrival, data distribution, the distribution of samples, comparisons, variance analysis, correlation, regression analysis, population size, measuring, emigration and immigration in a population, the peaking of population, specie variability, Chi square tests, rate of growth, Cochran's test, etc.

570. GIZHA, J.M.: Bridging the Stechiometry Gap
The Science Teacher, 48, 1981, No. 4, pp. 36-37. 2 figs.

Especially for beginners in the study of chemistry, the mathematics of chemistry - or stechiometry - is very difficult. This is especially true in calculations of the weight of a specific substance in a chemical equation. The author describes and on the basis of examples demonstrates a "bridge" for this purpose, i.e. an optical method on the basis of which it is possible to solve simple stechiometric problems, as well as more complex ones. A graphical representation method provided a comprehensive method. It was found that learning this method greatly contributes to improving students' self-confidence: they are able to more easily recall procedures in dealing with similar chemical equations.

571. HAYDEN, H.C.: Solar Energy: How Bright the Prospect ?
The Science Teacher, 48, 1981, No. 4, pp. 17-22. 4 figs.

The contemporary energy crisis has led to an increased interest in solar energy. Solar collectors have been built almost all over the world, and the public has expressed great interest in this energy source which has been known to exist long ago. However, the practical problems of utilising solar energy represent a problem known only to experts. The author, who is a physics teacher, deals with these interesting problems in a popular manner, while at the same time discussing other energy sources, such as water and wind power, the bio-mass and sea waves, as well as other technologies for obtaining energy to replace coal and petroleum. The outlooks for solar energy in the future are described by the author on the basis of numerous special studies.

572. HEATH, M.: Observing the Summer Skies
Natural Science in Schools, 19, 1981, No. 2, pp. 53-57.
8 figs.

Observations of the summer skies can be undertaken by the naked eye or with small-scale optics. Teachers can provoke the interest of their students with a general introduction to the constellations, which can mostly be seen with the naked eye. The author has chosen those constellations which are easiest to see (Cygnus, Vulpecula, Delphinus, Lyra, Hercules, Aquila, Sagittarius, Ophiuchus, etc.) and provided brief and interesting information on each. He also draws on mythology and the most important scientific data concerning the constellations, as well as information from the history of the natural sciences; he also provides explanations of such terms as meteor, star dust, etc.

573. HILLMANN, H.: A Natural Historian Looks Again at the Living Cell
Natural Science in Schools, 20, 1982, No. 1, pp. 3-7.
4 figs., 3 tabs.

The development of the microscope from Jensen and Leuwenhoek, up to the electron microscope runs parallel to the development of knowledge concerning the living cell. This development, especially its most recent stage, is the subject of various interesting comments by the author. He also discusses some of the difficulties which electron microscopy poses. Tables provide examples of electron microscopy; the author also acquaints readers with new terms which electron microscopy has created.

574. JENÍK, J.: Aklimatizace (Acclimatization)
Přírodní vědy ve Škole, 32, 1980/1981, No. 2, p. 51.

The author explains the term acclimatization as a process of the successful adaptation of an individual or population, specie or variety to new atmospheric conditions after its artificial transition to a different climate environment. People very often artificially transfere various species from distant regions into our own environment for aesthetical purposes or because of utility reasons. This transfere is called introduction and is closely associated with acclimatization.

575. JENÍK, J.: Antropoekologie (Anthropo-ecology)
Přírodní vědy ve Škole, 32, 1980/1981, No. 3, p. 92.

Anthropo-ecology is the ecology of human beings; it studies the interaction between human populations and their social organization on the one hand and the natural and technical environment on the other. It uses the term "areal" to denote the region in which a population or community has its eco-system or biota.

576. JENÍK, J.: Bioindikatory (Bio-indicators)
Přírodní vědy ve Škole, 32, 1980/1981, No. 4, p. 130

Bio-indicators are organisms (or parts of organisms), which clearly reflect the influence of some factor in the environment. The majority of environmental factors are invisible from the point of view of human perception. Man has used bioindicators since time immemorial, even if he has not been aware of this fact: hygrophilous plants in times of draught indicate an area otherwise very wet. Stunted pines indicate an arid biota, etc.

577. JENÍK, J.: Bióm (Biome)
Přírodní vědy ve škole, 32, 1980/1981, No. 5, pp. 172-173.

A biome is a physiognomically clear plant or animal community in a larger geographical area. The author describes the main biomes found on Earth (tropical rain forest; tropical and subtropical savanah, tropical and subtropical desert, continental steppe, deciduous temperate forest, boreal conferous forest and Artic tundra).

578. JANÍK, J.: Biomasa (Biomass)
Přírodní vědy ve škole, 32, 1980/1981, No. 6, p. 207.

Biomass is the quantity of living matter present in a specific area and at a specific time. The dry matter of the biomass is the basis for comparing various quantities of biomass. Dry matter is the weight of the living substance after it is dried to a more or less constant weight at an agreed upon temperature, for instance 90 °C or 105 °C. If measurements of the quantity of biomass are carried and repeatedly and properly we can determine the production of biomass, i.e. the quantity of biomass formed during a period of time. Dry matter in a biomass is the basic indicator of so-called energy content.

579. JENÍK, J.: Biotop (Biota)
Přírodní vědy ve škole, 32, 1980/1981, No. 7, p. 250.

A biota is a sum of physical and biotic factors, which in a specific locality form the environment for individuals, populations or communities. The term "biota" is subordinated to the term "eco-system", but this mutual demarcation depends on which organism or community is being considered apart from the whole system. Hence it is best to use the term biota always in combination with a specific individual, population or community.

580. JENÍK, J.: Diversita (Diversity)
Přírodní vědy ve škole, 32, 1980/1981, No. 9, p. 333.

Diversity is a characteristic of a system; it is manifest in the number and spatial distribution of the components (units) of which the system is composed. Specie diversity is an expression of the relation between the number of species and the total number of individuals within the framework of a specific community.

581. JENÍK, J.: Ekosystém (Eco-system)
Přírodní vědy ve škole, 32, 1980/1981, No. 10, p. 371.

An eco-system is a natural unit, which includes all the organisms found in a specific site, in interaction with the physical factors of the site; it is manifest through a structure of energy and trophic links.

582. JUIGNET, P. - LEFEBRE, D.: Aperçu géologique de la Haute Normandie (A geological outline of Upper Normandy)
Biologie, Géologie, 68, 1981, No. 1, pp. 89-100. 7 figs.

A certain monotonousness of the landscape in Upper Normandy is interrupted by morphological elements found in the shallow Seine river valley, whose meanders follow the route from Vernon to Toncarville (Vexin Normand), in the region of Liévin in the D' Ouche region (see maps provided by the authors.) The authors concentrate on these areas and describe their interesting geological structure, which is made up predominantly of Tertiary fluvial deposits, as well as the whole natural environment of this costal area. This landscape, as the authors explain, is especially suitable for the study of sedimentology.

583. KAJAK, Z.: Eutrofizacija zbiorników wodnych i możliwości jej przeciwdziałania (The eutrophication of water reservoirs and how it can be overcome) Biologia w szkole, 34, 1981, No. 2, pp. 67-79. 11 figs., 7 tabs.

The eutrophication of waters (i.e. their enrichment with nutrients) has become a world-wide problem. Essentially this is a natural phenomenon, because surface water is found in declinations in the surface of the land which become collecting vessels for various substances dissolved in water. In stagnant waters the amount of mineral substances increases and this in turn influences the strong development of phytoplankton. The eutrophication of waters has greatly increased as a consequence of human activities, specifically the use of chemicals in agriculture (artificial fertilisers). Also precipitation contributes to the eutrophication of waters (SO_2, Cu, pesticides, Hg, organic substances). Especially phosphorus contributes to the eutrophication of waters, and to a lesser extent also nitrogen. The limiting factor of eutrophication is carbon dioxide and light. The ratios of C:N:P are 50:7:1. Hence phosphorus dissolved in water is decisive for the quantity of phytoplankton. 1 kg of P makes it possible to produce 1 ton of plankton mass. The main source of phosphorus in water is sewerage. If we take the P out of water, eutrophication is prevented. The first stage of eutrophication can have a positive effect on water, since it leads to increased numbers of fish and provides them with sufficient food. The flushing out of mineral substances is usually lesser in the summer and the largest in the spring. In Poland it is assumed that in the period 1960--2000 the quantity of sewerage will increase 20 fold and the content of mineral substances in sewerage 3-4 times. Phosphorus gets into sewerage mostly from artificial fertilisers used on fields. The author also describes the manner in which phosphorus is found in different eco-systems, seasonal changes in its concentration, etc. The best protection of waters is protecting the soil against erosion, conserving local springs, leaning waste waters in purification plants and breeding fish in eutrophic reservoirs (some specie of sifh eat some species of algae).

584. KMITOWA, K. - BAJAN, C.: Zastosowanie mikroorganizmów w biologicznym zwalczaniu szkodników roślin (The use of micro-organisms in the biological combating of plant pests)
Biologia w szkole, 34, 1981, No. 2, pp. 123-125. 1 fig.

At present priority is given to biological forms of combating pests. In May 1980, in Ithaca in the state of New York (USA) an international conference was held organized by the international organization for the biological combating of pests (OILB). In a number of countries throughout the world intensive work is being done in this field. The authors provide a survey of work done in various countries. In China, Beauveria bassiana is used, in Australia the bacteria Thuringiensis var. israelensis and sphaericus are used against the Culex pipiens moquito, as well as the fungi Metarrhitium, Cordyceps and Beauveria, while in the USA the fungi Nomuraea rileyi and various other bacteria and fungi are used. The authors enumerate a number of them and describe their use and the places where they are used.

419

585. KOT, W.: Biochemiczne pokrewieństwa organizmów wyższych (The biochemical relatedness of the higher organisms)
Biologia w szkole, 34, 1981, No. 1, pp. 51-53. 1 tab., 1 sketch.

Knowledge of the genetic code and new methods of studying nucleic acids have provided new opportunities for studying the relations between genotypes and the possibility of determining the relatedness of organisms in evolution, as well as the relatedness between man and the higher mammals, on the basis of fragments of protein in the haemoglobin found in the blood of man, gorillas and horses. This might provide an example of the biochemical method in evolution. In 1957 V.M. Ingram discovered certain laws governing aminoacid patherns in polypeptide chains of haemoglobin and demonstrated that there is a difference between haemoglobin A (normal) and haemoglobin S (which is the outcome of a mutation) and which can be found in people with sickle-cell anemia. Haemoglobin is made of chains of haeme combined with the protein globin. The haem component is constant but the globin component differs in different species. Sickle-cell anemia is always linked to malaria (expecially in Central Africa). The parasite which causes it during its life cycle does not find suitable conditions when sickle-cell anemia is present in the haemoglobin. The author recommends this topic as a student assignment in the 4th class of general education secondary school with a bio-chemical specialization. In this excercise the students follow the sequence of aminoacids in analogical samples of haemoglobin from humans,horses and gorilas.

586. KVASNIČKOVÁ, D.: Ekologická valence "Doba setrvání škodlivin" (The ecological valency of "the duration of the potency of harmful substances")
Přírodní vědy ve škole, 32, 1980/1981, No. 10, p. 371.

Ecological valency is the range of factors and conditions in which a specific organism or community can successfully survive.

587. LEES, B.: Sediment Movement
Natural Science in Schools, 20, 1982, No. 1, pp. 23-26. 8 figs.

Drilling for petroleum on the ocean floor assumes extensive and high cost preparations, which include above all prospecting in sediments, with follow-up work in the laboratory. How this is done and the technical equippment needed are described by the author on the basis of her own experiences as a marine biologist. The movement of sediments and their structure are described, since their thorough knowledge is a prerequisite for building drilling platforms and assuring the safety of their operators. This information is very interesting for pupils because drilling for oil on the ocean floor is becoming increasingly important throughout the world.

588. MOLDAN, B.: Bilance (Balance)
Přírodní vědy ve škole, 32, 1980/1981. No. 3, pp. 93-94.

In connection with a study of the environment we often ecounter the terms energy and matter balance. In this context energy and matter flows are studied within a given system, as well as flows which take place at the interface between a system and its environment. An energy balance tells us the quantity of energy and its form which enters a system and/or is produced by it and what energy transformations take place within the system.

Matter balance studies indicate the geo-chemical circulation of matter in a closed system.

589. MOLDAN, B.: Cyklus (A cycle)
Přírodní vědy ve škole, 32, 1980/1981, No. 7, p. 250.

Flows of matter in eco-systems are mutually connected in such a way that they form closed bio-chemical cycles. From the point of view of the movement of matter, an eco-system forms a whole, which is in a state of dynamic equilibrium with its environment. An eco-system is thus almost self-sufficient; only the input of energy must not be interrupted, since without solar energy no life can exist. Man, by the purposeful modification of natural conditions, especially by the cultivation of the soil in agriculture, has formed a new component - the agro-eco-system. This agro-eco-system has similar characteristics as a natural eco-system. But in contrast to the cyclical metabolism of the eco-system or the agro-eco-system, an industrial type of metabolism is characterized by single-directional flows, which lead to the accumulation of waste. On the basis of such comparisons the advantages of a cyclical metabolism become clearly apparent.

590. PLAT, P.: Quelques Questions sur le Pain (Several questions concerning bread)
Biologie-Géologie, 68, 1981, No. 1, pp. 140-145. 1 fig.

The author, in the form of an interview, explains his opinions concerning the nutritional value of bread, on the basis on his research in this area. His point of departure is the grain of cereals, its selection and milling into flour. He describes the additives to the flour when bread is made, what influences its quality, the use of water or various types of milk (partially skimmed, aromatised, sweetened, yehgurt, non-fatty cheeses, etc.). Also various types of bread are described, including white bread, bran bread or rye bread. In conclusion, the author discusses various substitutes for bread in places where for various reasons bread cannot be made (when it is contraindicated for reasons of health).

591. RIDPATH, J.: Life Of Earth

Natural Science in Schools, 19, 1981, No. 3, pp. 65-67 and 75. 2 figs.

The author comments the possibilities of the further penetration of man into space by both the United States and Soviet Union with space ships and the possibility of the extended stay of people in space. He also discusses the development of life on Earth and the possible existence of life under the dense layers of the atmosphere surrounding Jupiter, where conditions are similar to those on Earth. Other discussions concern the possibility of contacting other civilisations and experiments which have so far been undertaken in this direction. The article is well written and easily understandable, even for pupils of the lower classes of secondary school.

592. RICHARD, P.W.: Human Pressure on Adelie Penguins in Antartica

The American Biology Teacher, 43, 1981, No. 4, pp. 196--200. 4 figs.

The population of the small Adelie penguins (Pygoscelis adeliae) which have for centuries bested in the cold and barren enclaves of Cape Peyds Rooker in Atartica, is now facing extinction. Not only predators from the water such as the Sea leopard or birds such as the Black-backed gull, but now also man have become the most important enemies of these penguins. Year by year the numbers of these birds decreases as a consequence of the accumulation of garbage, polar dogs and photographers, military planes and especially helicopters, as well as scientific expeditions and the construction of airfields. Visitors to the Antarctic often like to take their eggs away as souveniers. This very interesting study by an American biologist provides new information on a threatened specie.

593. RICHARDSON, M.: Plant Protein Inhibitors of Enzymes: Their Role in Animal Nutrition and Plant Defence
Journal of Biological Education, 15, 1981, No. 3, pp. 178–181. 1 fig., 1 tab.

The author analyses the role of inhibitors of enzymes on the basis of typical specific examples of enzymes which help digest proteins and carbohydrates; he also describes the metabolism of fats and nitrates which are all summed up in tables. Also the source of plant protein inhibitors are included in the table. According to recent research it has been found that the inhibitors of enzymes can also have an important function in the protection of plants against the effects of wounds, attacks of insects or the invasion of microorganisms. Experiments with specific insects on potatoe plants and tomatoe plants are described. The table of enzymes which we know are inhibited by plant proteins is very valuable.

594. SDOBNOV, S.I.: Agropromishlenniy kompleks strany (The agro-industrial complex of the country)
Biologiya v shkole, 55, 1981, No. 6, pp. 7-12.

The agricultural and industrial complex of the country will have an increasingly important role to play in the Soviet economy and in the development of all branches which are related to agricultural products. This complex can be divided into three parts:

- the production of the means of production (for instance tractors and agricultural machinery, machines for the food processing industry, the production of artificial fertilizers, industries based on microbiological processes, etc.;
- agricultural production as such - including crops and livestock;
- the processing industry for agricultural output (the food processing industry, the dairy and meat packing industries, etc.). Each of these areas has its own plan of development for the 11th five-year plan, so that the complex as a whole will fulfill the tasks set by the XXVIth Congress of the Communist Party of the Soviet Union.

595. SCHELLHORN, M.: Weltanschaulich-philosophische Aspekte der Biosönologie (Worldview and philosophical aspects of bio-coenology)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 113-119.

Bio-coenology is a science which studies the external and internal interaction of a biocoenoses, which makes is possible to study the dialectical unity which exists between a biocoenoses as a unity of contradictions. The main components of every bio-coenoses are phytocoenoses, zoocoenoses and microbiocoenoses. A contradiction exists between synthesis and the destruction of organic substances in the circulation of matter, which at the biocoenoses level of organisation of life can be considered as the basic contradiction of living organisms. This circulation is a unity of two mutually contradictory, but mutually linked and mutually assumed processes - synthesis and the destruction of organic substances - on the basis of synthesis and destruction as well as autoregulation take place. The latter is the foundation for the survival and evolution of the biocoenoses. The author also discusses succession, which is the basis of evolution of a biocoenoses, as concieved by the modern synthetic concept of the evolution of the species.

596. SCHOLZ, E.F.: Energie und Umwelt. Eine Unterrichtseinheit zum Problem "Biologische Nutzungsmöglichkeiten der Abwärme im Einzugsgebiet thermischer Kraftwerken" (Energy and the environment. A teaching topic concerning the problem "Biological opportunities for the utilisation of waste heat in the vicinity of thermal power stations")
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 12, pp. 447-460. 2 figs., 6 models for transparencies.

Sufficient supplies of energy have become an acute problem in all the countries of the world. This supply is, however, being constantly threatened due to insufficient reserves of petroleum, its constantly growing price and the increased threat to the environment. The energy shortage is among others also being dealt with by the construction of atomic power stations. The article discusses the possibility of utilising waste thermal energy in the form of waste water from thermal power stations. Such water can be used for a number of purposes, such as for instance in the limnotherm project where this heat is used to produce a valuable source of protein food - fishes. The warm water is pumped into breeding tanks where it accelerates the growth of fishes. It shortens the time needed for a carp to reach maturity by one quarter, and for eels by one fifth. The output of fish in conventional fish breeding facilities is 150 kg of fish per hectar of fish pond annually, while in a limnothermal project it achieves 1500 kg of fish annually. Limnothermal projects have such a high output because of the continually high temperature of the water, its high oxygen content, the non-existence of negative climate factors and the prevention of disease among the fish. Another possibility is an agro-thermal project, where waste thermal energy is used to cultivate sub-tropical plants; the warm water can also be used for cultivating vegetables, etc. Also large hothouses for the cultivation of vegetables or flowers can be heated with waste hot water.

597. SMALL, J.R.: What's in the Ocean
The American Biology Teacher, 43, 1981, No. 6, p. 312, 316, 1 tab.

A marine biologists here describes the world's oceans from the point of view of seawater, its mineral content and the chemicals found in the seas. All data is calculated per cubic mile of water which contains for instance 60 tons of Strontium, 45 tons of Silver, 25 tons of Gold, approximately 1/2 kg of Radium, etc. The author also explains the so-called law of relative proportions between minerals and other chemicals in the ocean and the role of the oceans as regulators of the atmosphere. Also the future industrial exploitation of the oceans is discussed; they represent an inexhaustible and constantly replenished wealth of 330 million cubic miles of sea water, waiting for economical methods of mining and processing.

598. SOKOŁOWSKI, A.: Charakterystyka ekologicznofito-socjologiczna zbiorowisk roślinnych puszczy Białowieskiej (A characteristic of the ecological and phyto-sociological plant communities of the Bialowieski forest) Biologia w szkole, 34, 1981, No. 1, pp. 7-14. 2 photos.

The Bialowieski virgin forest takes up an area of 120 000 hectare. It is not only a forestry complex, but also in the course of 300 years, farmers have settled there, cleared the forest to make fields and cultivated them. Nevertheless, the area has a high degree of virginity. The Polish part of the area covers 58 000 hectare, of which 49.9 thousand are forest, i.e. 86 % of the area. The remainder are fields, meadows and gardens where secondary field and synantropic plant communities exist. The area has 113 of the 250 plant communities which are found in Poland. 38 of them are natural and of this number 26 belong to the forest and shrubbery, 12 are of the non-forest (water, bog, spring or peat) type; 45 are semi-natural (for instance meadows, Heather fluvial deposits, Sweet flag), 30 are synantropical communities (in fields, gardens, around roads, etc.). Anthropogenic plants now take up approximately 15 % of the territory of Poland. The author describes individual plant communities in the Bialowieski area and their characteristic representatives in detail.

599. SORRELLS, N.R. - PIMENTEL, D.: Food, Energy and the Environment: Alternatives for Creatings New Lifestyles The American Biology Teacher, 43, 1981, No. 4, pp. 190--195, 2 figs.

Human society can no longer afford to waste energy resources or to pollute the soil and water which are a source of food. New agricultural methods will have to be developed to overcome the increasing threat of food shortages. The article deals with the main trends and problems connected with energy, the soil and water resources in the production of food in industrial societies and in ecologically sound systems with low energy inputs. The interdependency and linkage existing between agriculture and social factors is documented in a very interesting manner.

600. SHAMIN, A.N.: *Uspekhi sovetskoy biologicheskoy nauki* (The success of Soviet biological science) Biologiya v shkole, 55, 1981, No. 1, pp. 8-12.

A basic characteristic of contemporary biology is the comprehensive nature of research based on cooperation between biologists of various specialisations and the staff of various scientific institutions. The author discusses in detail the main areas of this cooperation: the utilization of soil and water resources, the transition of agriculture to an industrial basis, increasing the efficience of the use of fertilizers and the chemical protection of plants and animals against disease pests, etc. Other projects include a study of new physiologically active media (such as antibiotics and vaccinations), research which concentrates on the physical and chemical aspects of biological processes (the structure and function of bio-polymers, proteins and nucleic acids), the development of microbiological industrial processes, research pertaining to the productivity of the eco-system, the influence of man upon the biosphere and experiments carried out with biological objects during space flights.

601. Terminologický slovníček - I. (A small dictionary of terms - I.)
Přírodní vědy ve škole, 32, 1980/1981, No. 1, pp. 10-11.

Adaptation is the ability of living matter to adjust to the influence of a specific external environment and to anchor this adjustment in its inherited characteristics. The author cites a number of examples.

602. THIELE, K.: Waldökosysteme gemässigter Klimazonen (Forest eco-systems in the temperate climate zone)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 7, pp. 199-208. 16 figs.

The article discusses the dependency of a forest eco-system in the temperate zone upon abiotic and biotic factors, as well as energy flows and the flow of matter in such eco-systems, the conditions for the existence of the forest, the forest community, producers, macro-consumers and micro-consumers. Also the basic characteristics of the eco-system are explained, its biomass, circulation of water and nutrients, the temporal dimension of the development of the forest, its stages of development, variety of species and the structural changes which take place in it.

603. TILLE, R.: Vergrösserung und Verkleinerung von Oberflächen - ein biologisches Prinzip (Increasing and decreasing the surface - a biological principle)
Biologie in der Schule, 30, 1981, No. 4, pp. 143-151. 3 figs., 5 tabs.

An increase in the surface of an object makes it possible for it to intake, transport, stock and output larger quantities of matter; it is thus characteristic for a number of biological systems. The author first deals with the significance and forms of increasing or decreasing surface area. External articulation is an important characteristic of autothophic organisms while in heterotrophic organisms internal articulation is important. Increasing the surface of a body is achieved by elongation, protrusion or streching, while a decrease is achieved by shortening or rounding. The author cites a number of examples im this context. This makes it possible to explain the advantage provided by a round--shaped body, such as is found in protozoa, hibernating animals, cacti and others.

604. UNDERHAY, V.H.S.: Microbiology of the phylloplane - a habitat suitable for microbiological project investigations in the sixth form and in college
The School Science Review, 63, 1981, No. 220, pp. 280--281. 1 tab., 13 lit.

It has long been known that the surface of ripe fruit is covered with a variety of different yeasts which are responsible for the successful or unsuccessful fermentation of the fruit (for instance of grapes and the juice pressed from them). But only since 1930 has it become known that also the surface of leaves contains a rich sample of microbial organisms. This surface is called a phylloplane (layer on the surface of a leaf) and can be studied in detail. Various types of bacteria, actinomycetes, yeast and fibre fungi appear on the surface of the leaf as soon as it develops form a leaf bud. These organisms are chemo-organotropic, saprotrophic and slightly parasitical. They thrive on the exudates of leaves, the feces of plant lice, the remnants of disintegrating cells, necrotic cells, pollen and perhaps also leaf cuticle. The author describes various types of bacteria, actinomycetes, yeast, fibre fungi and microbial successions on leaves. He also shows the consequences of a polluted environment upon the composition of the phylloplane.

605. VLAKHOV, S.: Nastayashche i bdeshche na kosmicheskata mikrobiologiya (The present and future of space microbiology)
Biologiya i khimiya, 24, 1981, No. 2, pp. 13-16.

For the time being microorganisms are the best models of living organisms for use in the experimental study of the influence of space factors on a living organism. The bacteria Escherichia coli and Clostridium are most frequently used for this purpose. It has been found that these bacteria are capable of surviving extreme temperatures and in an anabolic state they are capable of surviving for very long. It is quite likely that microorganisms are capable of travelling to distant planets with meteorites as their vehicles. It is assumed that life in space can be maintained in this simple bacterial form and that is develops further only in those cases when suitable conditions are formed on some planet.

606. WASOWSKA, M.: Sukcesja ekologiczna (Ecological succession)
Biologia w szkole, 34, 1981, No. 5, pp. 269-276. 5 figs., lit. 6.

Ecological or biotic succession is an ordered process which includes changes taking place in time, of the specie structure of a biocoenoses. It is the outcome of changes taking place in an abiotic environment under the influence of the biocoenoses. The motor of succession in the majority of cases is the biocoenoses itself, in spite of the fact that the abiotic media indicate the trend and speed and often also the limits in which this development takes place. If all biocoenoses begin in a sequence at the same place, then we can speak of sequential succession. The point of culmination in the development of a series of biocoenoses is a stabilized biocoenoses or so-called community climax. Primary succession takes place very slowly, while secondary succession more rapidly, since the substrate is not longer infertile and some specie of organisms are already inhabiting the terrain. In a forest terrain a climax biocoenoses will form in about 200 years, in ploughed land in 20-40 years. It is necessary to distinguish autogenic succession which takes place in the biocoenoses itself, regardless of the processes taking place there, while an allogenic succession takes place due to the influence of external abiotic factors upon the biocoenoses, as well as due to the influence of biotic factors. Autogenic succession cannot be reversible. In nature, usually a combination of both types of succession take place. Two theories have been formulated concerning the question of when succession is complete. American scientists, on the basis of studies of American nature, use the monoclimax theory, while European scientists, on the basis of studying European nature, speak about the polyclimax theory. A climax has its phylogeny and has a marked tendency towards stabilisation. A climax can be maintained in the course of millions of years. Thepolyclimax theory was developed independently; according to it several stabilised biocoenoses (or climaxes) develop, which are no longer subject to any progressive succession. Hence in nature a mosaic of climaxes develops. In nature we can find natural communities and artificial ones (anthropological ones); both types have a tendency towards succession and are transformed into a final and permanent community. Also a theory of a system of climaxes exists, which differs from the two preceding theories by its definition of a biocoenoses (an individualistic concept of a biocoenoses). This theory follows the distribution of plants on the basis of changing conditions in the environment. Subsequent generations react to these changes to a large degree independently and form a biocoenoses which is stable in tome, i.e. a continuum. In such a biocoenoses, several smaller biocoenoses may develop with the passage of time on the basis of the frequency of incidence of an individual or several dominating species. However, an absolute climax does not exist for any region. The article also deals with the succession of animal biocoenoses. Changes in flora also cause changes in fauna. The greatest changes develop among animals when the dominant plant form changes. Also a correlation exists between specie variety of flora and fauna. Thus for instance no specie of bird is capable of developing in every stage of succession. In ecological succession also changes in food chains occur. In all stages of succession trophic organisms are connected in a simple and linear manner and primary netto producers are exploited by heterotrophic organisms through food chains (plant - herbivorous animal - carnivorous animal). In the mature stages of succession food chains change into food networks and the transmission of energy in the environment takes place primarily through detritus. During the longer duration of such a mature biocoenoses various adaptation mechanisms develop which prevent the eating of a plant. Stress and changes caused by internal factors can rid an ecosystem of these protective mechanisms and cause an explosion in the development of some species, for instance a large-scale invasion of pests takes place. The quantity of organisms capable of life in a specific area can also influence an increase in the size of the organism, an extension of its life span, making its biology more complex and intensifying inter-specie competition. Even more important in an increase in the various types of relations between organisms, for instance a strengthening of symbiosis. However, regardless of the degree of stability of an ecosystem, certain changes always occur.

607. WELLS, R.V.: Invasion ecology and school biology - I. The School Science Review, 62, 1981, No. 220, pp. 417-423. Lit. 29.

Adaptation makes it possible for organisms to penetrate into a new environment. In some organisms we can see preadaptation, when already in an old environment they are able to find elements of the new environment and thus enter the new environment already partially adapted to it. Tolerance theory studies the limits of tolerance, i.e. the quality of the conditions in which an organisms is still capable of surviving in a new environment. A potential site represents all the environments in which an organism would be capable of living, i.e. not only the environment in which it is actually living. An organism penetrating a new environment is an alien and an organism penetrating a new environment is termed adventive; an organism whose entry is successful is called an anvasive organism; sometime it proliferates so rapidly in the new environment that it can be called an explosive organism. In the new environment an organism occupies a food niche, which does not necessary have to be identical with its niche in the original environment. Invasive organisms change the composition of the original biocoenoses. The author cites the example of the Galapagos islands, which already Charles Darwin described. In this way genetic drift takes place. A new organism can be introduced into a new environment by man (this is called introduction), either purposefully, or by accident or this can take place without human intervention. Newly arrived organisms usually, however, bring other organisms with them, for instance their own parasites. They, however, come to a new environment without the limiting factor of predators, etc. On the other hand the newly arrived organisms may die and disappear, or they remain in the area but are lacking in a food niche or place in the food chain, or they do not find adequate conditions for reproduction Sometimes in a new environment man forms suitable conditions for newly arrived organisms (hothouses or the promision of exotic locust). Some newly arrived organisms are, however, capable of adaptation even to very different conditions provided by the new environment, they proliferate and occupy new areas (for instance the Colorado potato bug). A freer supply of food usually makes the spreading of new organisms easier. Sometimes the hybridization of the new and the domestic organisms takes place.

608. WILD, A.L.: Saturn - A Spectacular Encounter
The Science Teacher, 48, 1981, No. 8, pp. 57-59. 5 figs.

The research done by the space capsule Voyager II sent to Saturn has produced new information about this planet, which is 95 times bigger than the Earth. It was photographed from a distance of 101 thousand kilometers. The author describes the preliminary findings of the project and discusses the rings around Saturn and its nine large and eight small moons, as well as its climate as it has been measured by the cameras and measurement instruments on Voyager. The article contains colour photographs from the maximum point of approach of the space craft to the planet, as well as other findings which on the one hand confirm existing theories, but on the other have provided material for new teories concerning this huge planet.

609. ZOTT, R.: Der Biologieunterricht und das Verhältnis von Natur und Gesellschaftswissenschaften (Biology teaching and the relation between the natural and the social sciences)
Biologie in der Schule, 30, 1981, No. 4, pp. 171-174.

One of the characteristic traits of contemporary science is its differentiation and integration. This also concerns the integration of the natural and the social sciences, which should be implemented in school instruction. Their unity should be approached as one of the worldview aspects of the scientific adn pedagogical principles of socialism. The significance of this unity is also in the rejection of anti-humanist concepts and ideological subversion. In school instruction this unity can be manifest in a new approach to interdisciplinary relations, the role of the teacher, etc.

15.1 Botany

61[illegible]. BAKER, D.A.: The Transport of Ions Across Plant Cell Membranes
Journal of Biological Education, 15, 1981, No. 2, pp.90--95. 5 figs.

Plants are the main selective accumulators of inorganic nutrients from the soil. The accumulation of inorganic substances is a process upon which other forms or life are directly or indirectly dependent. A study of how ions accumulate and how they are transported across cell membranes had greatly advanced; the author describes the most recent findings in this area, specifically the transportation of ions into the cytoplasma of plant cells through the external membrane of the cell. Practical examples are also cited which concern this process, as well as very good diagrams.

611. BARKER, J.A.: Plants Bite Back
Journal of Biological Education, 15, 1981, No. 1, pp. 15--18. 4 figs.

A number of biological facts can be derived from a study of carnivorous plants, which have been a subject of interest on the part of biologists and botanists since Charles Darwin. The author selected and shows on photographs three specie of tropical carnivorous plants whose whole habitus is adapted to catching living prey: Sarracenia alata, Sarracenia minor and Nepenthes Utricularia. He describes the mechanism of their "traps" and how they can be cultivated, their feeding and life cycle. In 1978 a Society for Carnivorous Plants was founded in London, whose members cultivate them and popularize knowledge about them. The society has as its members both amateurs and professional biologists.

612. BYBEE, R.W. et al.: Human Ecology: An Approach to the Science Laboratory
The American Biology Teacher, 43, 1981, No. 6, pp. 304-311, 326.

An interesting study concerning contemporary human society with its increasing social problems; school instruction is certainly not keeping up with this development. Human ecology based on scientific study is still absent from the laboratory, in spite of the fact that the ecological problems of the human race have greatly intensified. Among the ecological problems the author cites are large-scale accidents, armaments, chemical waste, smog, crime and violence, sudden changes in the weather, epidemics, the energy crisis, undernourishment, overpopulation, racism, sexual conflicts, hunger, unemployment, stress and a number of others. In conclusion the authors recommend the writing of a textbook on these topics, which would serve as the cornerstone of a new approach to human ecology.

613. FLAKENHAHN, H.H.: Neue Erkenntnisse zur praktischen Pilzkunde (New knowledge concerning practical mycology) Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 11, pp. 350-352. 4 figs.

1000 different species of mushrooms can be found in the FRG. The author provides instructions on how to collect mashrooms (the problem of cutting off the fruiting body, which makes identification more difficult, collecting mushrooms into a basket and not a plastic bag, collecting only young and hard mushrooms, cutting away wormy of spoilt parts). The author points to the repeated mushrooms poisonings which take place and the basic rule of collecting only those which are well known to the collector. He describes various species of mushrooms which are poisons or otherwise dangerous and their most important, diacritical signs which distinguish them. Only mushrooms with gills are mortally dangerous. The differences between the various Amanitas are described, how they differ from the champignon, the saffron milk cap, etc. The description of various groups of mushrooms, like the Boletus or the Puffballs are very interesting. Poisonings can also be caused by mushrooms which are mashed, too old, etc. Some people are allergic even to edible mushrooms and should therefore avoid them altogether.

614. KLUGE, S.: Pflanzliche Protoplasten - Forschungsobjekte mit Zukunft (Plant protoplasts - research objects with a future)
Biologie in der Schule, 30, 1981, No. 12, pp. 537-539.
2 figs., 3 tabs.

Cocking prepared plant protoplasts for the first time out of tomato roots and this openned up new possibilities for various experiments. At the end of the sixties and during the seventies protoplasts were isolated from a number of cultivated plants. A mixture of the enzymes pectinase and cellulase is used to achieve this end. Freshly isolated protoplasts are suitable objects for studying a number of physiological and bio-chemical problems - such as permeability, organelle isolation, etc. Protoplasts can also be cultivated for the purpose of observing their division, fusion and the regeneration of the whole plant. In 1971 scientists were successful in isolating the protoplasts of tobacoo mesophyll and to obtain a whole plant in 4 months. Such experiments have been successful with the following plants: Solanaceae, Asparagus officinalis, Brassica napus, Dancus carole, Bromus inermis, etc. Protoplasts are also suitable objects for studying cytogenetics, because protoplasts of various species can be combined, etc. They are also useful in virology.

615. MAKAROVA, T.V.: Selektsiya ovoshchnikh kultur (Vegetable culture selection)
Biologiya v shkole, 55, 1981, No. 1, pp. 13-18.

The author describes three basic methods: selection, sexual hybridization and heterogenous selection, which make it possible to carry out the recommendations provided by the Institute of Nutrition of the Academy of Sciences of the USSR; each person should consume 122 kg of vegetables annually: 30 kg of cabbage, 29 kg of tomatoes, 11.5 kg of onions, 11.5 kg of cucumbers, 9 kg of carrots, etc. This leads to the basic task not only of increasing the productivity of vegetable crops, but also cultivating varieties of egetables which are resistent towards cold and arid conditions, which allow for the mechanization of cultivation and harvesting work done at the same time. Another requirement is resistence to various plant diseases, morphological and biological homogenity and suitable mechanical properties. It is important to extend the assortment of hothouse vegetables produced (lettuce, celeriac, dill, spinach, etc.). An acceleration of selection would greatly contribute both to the development of science and the introduction of its findings into practical gardening. At present a new variety of annual plants takes 8 - 10 years to cultivate and with biennials this period is 15 - 20 years. The aim is to achieve 2 - 3 generations per year (especially by utilising various geographical zones in the USSR during various times of the year).

616. MARGULIS, L.: How Many Kingdoms ? Current Views of Biological Classification
The American Biology Teacher, 43, 1981, No. 9, pp. 482--498. 9 figs., 1 tab.

During the last several decades, due to the development of cytological techniques and a better understanding of evolutionary biology, the original division of nature into two or three kingdoms has become doubtful. In 1959 prof. R.H. Whittaker drafted a new classification of five biological kingdoms: Monera, Protista, Animalia, Fungi, Plantae. The author devotes this article to these five kingdoms and deals specifically with the problems of types of cells, nutrition, metabolism, reproduction and evolution, life style, characteristic structures and functions. A special section of the article is devoted to a comparison of sexual relations in individual kingdoms. Diagrams and microphotographs provide clear illustrations of the author's comments.

617. RUSHTON, B.S.: *An Expanded Classification of the Plant Kingdom*
The School Science Review, 62, 1981, No. 221, pp. 648-654. 4 tabs., 14 lit.

The classification of plants is an important component of botany studies in secondary schools and institutions of higher learning. Contemporary textbooks mostly continue to use old classifications. New classifications do not distinguish merely between the plant and animal kingdoms, but also include viruses, Eucaryote and Procaryote. The author has drafted a uniform classification for the hierarchical study of the plant kingdom: Regnum: Planta; sebregnum : Rhodoplia, Chrysoplia, Chloroplia. The subregnum Rhodoplia includes the division Rhodophyta. The subregnum Chrysoplia includes the divisions: Crysophyta, Xanthophyta, Bacillariophyta, Pyrrophyta and Phaeophyta. The subregnum Chloroplia is divided into the superdivision Paraarchegoniaphyta and the division Chlorophyta, Charophyta, Euglenophyta, as well as the superdivision Euarchegoniophytera and the division Bryophyta with the classes Hepaticopsida, Anthoscerotopsida and Bryopsida, the division Tracheophyta, subdivision Pteridophytina and the classes Psilophytopsida, Psilotopsida, Lycopsida, Sphenospida, Pteropsida, the subdivision Spermatophytina and the superclass Gymnopsermitia with the classes Cycadopsida, Coniferopsida, Gnetopsida, the superclass

Angiospermitis and the classes Magnoliopsida and Liliepsida. The author describes individual categories of this system.

618. SHEFFIELDE-BASTIN, J.H.: Isolation and Applications of Plant Protoplasts
The School Science Review, 62, 1981, No. 220.

An isolated protoplast is an important object of study of various physiological processes. The protoplast can also be used to study the relationship of water and the plant, for demonstrating the activity of cellular poisons, as well as substances which slow down or accelerate the cell's metabolism. The isolation of protoplast can also serve for demonstrating the significance of the cell wall for the cell. One method for doing this is mechanical isolation, in which cells are diluted; this concerns primarily the protoplast on the cell wall. For some types of plants this method is suitable, in spite of the fact that the output of protoplast is very small. Larger quantities of protoplast can be obtained by more modern methods, which use special enzymes (pectinase or cellulase, or a mixture of both) for doing away with the cellular wall. Japanese firms sell special enzyme substances for this type of laboratory work, under the name macro-enzyme or the tradename Driselase. The author describes how to use these substances and the outcome of their use. The protoplast can then be observed under the microscope. Also the effect of various other substances upon the protoplast can be studies under the microscope.

619. WEBER, H.: Pilzprotoplasten in Forschung und Praxis (The protoplasts of fungi in research and practical use) Biologie in der Schule, 30, 1981, No. 11, pp. 485-490.

A cellular wall can be done away with in the laboratory. If this process is carefully controlled, for instance when some specific enzymes are applied, the inner protoplast will remain intact and under specific circumstances this protoplast can represent the functionally active part of the cell which also contains the metabolism function, including the ability to synthesize cellular walls and form an intact whole cell. A mixture of the enzymes needed for isolating fungal protoplasts can be obtained from the intestinal juices of the garden snail or from various microorganisms (Trichoderma, Penicillium, Streptoyces, etc.). The protoplasts of bacteria and plants can be obtained after the application of lysosomes and cellulase. The freed protoplasts have a round shape. The author goes on to describe the regeneration and reversal of protoplasts, their use in the study of cytology, bio-chemistry, molecular biology and their importance for the study of genetics and fusion.

620. WERNER, E.: Wie sich Pflanzen vor ihren Feinden schützen (How plants protect themselves against their enemies)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 11, pp. 432-434. 2 worksheets

A large number of methods by which plants protect themselves are described by anatomy and morphology. Plant enemies include herbivorous animals, as well as sucking insects. Problems connected with the protection of plants against their enemies are demonstrated on the basis of the example of hermaphrodite nettles and their stinginghairs, which protect the plant before hebivorous animals. The author also describes the protection of the tobacco plant against herbivorous animals through special nicotine cells in the leaves. The taste of these cells also repels sucking insects. Another repelling substance was discovered in Australia in clover. Its name is equol and it protects the plant before small herbivorous mammals (rodents). But the substance has an interesting effect on sheep. In the period 1940--1945 there was a decline in the birth rate of Australian sheep by up to 70 %. Scientists studied the mystery and discovered its cause in equol, which causes the mammilary glands of the sheep to function even when the sheep is not pregnant. Even castrated rams began to lactate as female sheep did. Equol function as estrogen hormones do during pregnancy.

15.2 Zoology

621. BERGMANN, H.H.: Aggression unter ethologischer Aspekt - ein Glossar (Aggression from an ethological point of view - a glossary)
Der Biologieunterricht, 17, 1981, No. 3, pp. 54-55.

The study of the natural sciences is possible even in cases when we do not have a precise definition - for instance games among animals. However, school instruction should use precisely defined and properly formed terms. So far, however, ethology does not have all its terms precisely defined and for this reason the author has developed a glossary, which provides definitions, at least on a preliminary basis, of such terms as agonistic behaviour, aggression aggressivity, real combat, threatening behaviour, preening, preparation for action, intention, interspecie aggression, combat, etc.

622. BRADY, J.: Biological Clocks
Journal of Biological Education, 15, 1981, No. 3, pp. 182-184.

The author deals with existing knowledge concerning three important aspects of the physiology of biological clocks: the so-called eye clocks of the mollus Aplysia depilans, the role of the nucleus (the theory of nuclear clocks) and the contraversy among scientists concerning internal and external time, i.e. whether external factors influence internal organisms or whether these organisms have their own time-keeping mechanism, which determine the time rhythm of the animal. The author cites various examples of such biological clocks on the basis of the example of the mollusc Aplysia depilans and on the basis of the Paramencium candatum. Science is not yet fully capable of explaining this interesting phenomenon.

623. BROOM, D.M.: The Biology of Behaviour
The School Science Review, 62, 1981, No. 220, pp. 442-451. 2 figs., lit. 27.

Ethology deals with the behaviour of animals. The science was founded by Lorenz, Tinbergen and Fritsch. At present ethology has become an important component of biology, both as a science and a teaching subject, just as physiology or morphology. Among the subjects it deals with are the acquisition of food, how animals avoid predators (hidding, avoiding dangerous territory, running away, combat, a combination of combat and running away), anti-predator behaviour, chemical prevention of hazards to life (defecation and urination in specific places), physical avoidance of hazards (the forming of flocks, schools and herds), hidding, burrowing, pretending to be dead, keeping quiet, etc. as well as physiological regulation and maintaining osmosis, homeostatic mechanisms, maintaining temperature, reproduction, and a selection system. Individual terms are explained in the article and examples are cited for them. In conclusion the author discusses the evolution of social behaviour.

624. DABROWSKA-PROT, E.: Ekologiczne problemy walki biologiczne z komarami (The ecological problems of biological combat with mosquitos)

Mosquitos transmit a number of disease including yellow fever as well as meningitis, filariasis and others. The development of civilization has led to the need for combating mosquitoes, since it has led to the rise of suitable sites for mosquito breeding, has accelerated their spreading to various parts of the world, and has thus facilitated the spread of mosquitos to areas which have already been rid of them. For instance the transportation of drinking water by ship has spread mosquitoes from New Quinea to various Pacific islands and the specie Anopheles has followed people into the taiga where it causes various diseases. Mosquitos are well adapted to migration and are capable of populating varied environments; they are often synantropic. The biological combat of mosquitos can be achieved through fish who eat the larva and pupa of mosquitos. Man also tranforms the environment in order to do away with their breeding grounds by land reclamation and drying out swampland (in Sardinia, Northern Africa, in Tennessee in the USA). This in turn leads to specie changes in the mosquitos themselves. Also the planting of trees and shrubs on river banks leads to a decrease in the mosquito population, as well as the propagation of water plants on the surface of the water. Also such population-bound phenomena as decreasing the food available to a Aedes aegyti population or decreasing the life span of adult mosquitos or the bio-coenotic liquidation of mosquitos (their reduction) for instance when the larva are eaten by tadpoles or fish (Gambusia) are used to combat the incidence of mosquitos. The mosquito which spreads the parasite causing Wucheria bancrofti on the South Pacific islands was destroyd by the Coelomomyces stegomyiae fungus, which was isolated in the mosquito population of Singapore. The fungus Etnomophthora conglomerati was used against the larva of Culex pipiens in Moscow, while in Northern Rhodesia, Coelomomyces ascariformes was used against Anopheles and destroyed 95 % of the population. The struggle to wipe out mosquitos is more difficult at the imago stage. The World Health Organization annually spends approximately 300 million dollars for combating malaria, which annually causes the death of one and a half million people. The methods of combating mosquitos are becoming more sophisticated and also ecology has made its contribution. Some specie of mosquitos have two populations, one attacks birds, while the other is anthropophilous, such as the Aedes gambiense mosquito, which in Tanzania has a population which is 35 to 75 % anthropophilous. A means of combating the insect is to sterilize mosquito males which are then set free. Similar methods are also used against the domestic fly and the Tse-tse fly. Sterilization is carried out by radiation, chemically or genetically. For some birds, mosquitos are an important source of food, for instance for the bird Tetragonatha montana, mosquitos represent 75 % of its food. Mosquitos also have their own parasites which include protozoa, bacteria and fungi. On the other hand it has been found that the fungus Entomophthora coronata, used to infect the domestic fly, can cause phytomycosis in man and horses.

625. FEDORENKO, A.: Z ekologie stonki ziemniaczanej
(On the ecology of the potato bug)
Biologia w szkole, 34, 1981, No. 3, pp. 143-147. 3 figs.

The insect Leptinotarsa decemlineate SAY has provided a number of surprises for scientists when they studied its biology and ecology. This insect is highly adaptable and it easily populates environments which greatly differ as far as temperature and dampness are concerned. It has been shown that enzymatic processes are most important in stabilizing a new type, as well as regularity and the quality of its metabolism; the enzyme is also responsible for the alternation of activity and rest by the insect. The morphological structure of the potato bug is fairly stable and does not change, but its bio-chemical and other processes are very unstable. Any change in its life conditions leads to changes in its biochemical reaction. During the first stages of this adaptation process a breakdown in coordination occurs and an increase in its lability takes place. If however, a part of its population survives, then various bio-chemical processes become less important and the reaction to changed conditions becomes stabilized as the standard, while marginal readings change. Experiments with this insect in the USA, where the Potato bug was transfered from the temperate climate in the vicinity of Chicago to the Arizona desert indicated that already in 6 generations (i.e. during 2 years) the bug developed a capacity to survive a lack of water by accumulating water during the diapause. The same population again transfered back to the vicinity of Chicago, however, died in 99 % of the cases, because the quantity of water was now too large. Individuals who survived in great soil depths, however, sired a new population, which again was adapted to the larger quantity of water. The lability of the biological and bio-chemical processes taking place during the diapause was shown to represent a period of adaptation to seasonal changes. These changes are independent of non-variable genetic characteristica. The Potato bug was shown to be a highly adaptable organism because it uses varied forms of physiological rest and besides a winter diapause it also has a summer diapause in the middle of July, which concerns only about 40 % of the population; while 3 - 5% of the population continues resting straight on from one diapause to the next and emerges only in the spring. The summer diapause protects part of the population before the negative climatic conditions of the summer (arid periods followed by extensive rainfall). During the diapause, the insects are resistant to chemical intervention. These insects also have a high degree of physiological variability. On a plant, 3 to 4 generations develop, the males copulate several times and the sexual chambers in the female ovaries have a life span of 2 years, while the fertilised egg matures in 14 hours to 15 days. At - 4°C part of the population dies, but another part survives up to - 12 °C. At present the Potato bug has become integrated in various biocoenoses and only in Europe already 50 specie of entomophages have been found to invade the Potato bug. When the number of Potato bugs is small, it is best to use biological means of combating them, while chemicals should be used only when their incidence is large-scal; in such cases there is always the danger that the insect will develop an immunity against the chemical used.

626. Flöhen aus dem Nistkasten (Fleas in bird boxes) Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 6, p. 189.

48 species of birds have fleas. They are very frequent in Titmice found in bord boxes. But also Starlings, Sparrows, Flycatchers and Redbreasts often have them. When these birds nest in bird boxes made by people for them, the fleas tend to greatly multiply. Their larvae are not dangerous for the young birds, but when there are a great many of them, they can, especially during later hatchings, kill a young bird during 1 to 3 days. In a single bird box up to 2576 fleas have been found. It has also been found that in cement bird boxes they tend to multiply much more slowly than in wooden boxes. Bird boxes should be cleaned after every hatching of eggs and the nest inside thrown away (by putting it in a plastic bag and burning).

627. HELB, H.W.: Aggresives Verhalten - Beobachtungen und Freilandexperimente zur territorialen Aggression bei Vögeln unter besonderer Berücksichtigung akustischer Signale (Aggressive behavious - observations and experiments outdoors concerning the territorial aggression of birds with special attention to acustic signals) Der Biologieunterricht, 17, 1981, No. 1, pp. 72-96. 24 figs.

Animal behaviour can be studied at selected sites outdoors or in the laboratory. The subject of study can include spiders, crustacenas, insects, fish, echinodermata, amphibians, mammals and especially birds. Aggression is considered to be a physical act or threat to an individual, which reduces or limits the freedom and genetically determined abilities of another animal.The article deals in detail with the territorial aggression of birds. Territorial aggression ensures for the individual bird sufficient food, facilitates the seeking of a mate and copulation, provides protection against predators by a very good knowledge of the terrory in question and limits confrontations with rivals. On the basis of a detailed study of the ethology of the animal in question, an ethogram is drawn up, which is actually a detailed catalogue and description of all behavioural patterns, including acoustic signals found in the animal. The repertory of acustic signals is described by a so-called sonogram, and its variability in the course of the day, the year and also by meteorological influences. The author demonstrates how an ethogram and a sonogram are made for one of the Old World Warblers (Phylloscopus trochilus). He shows how it is possible to determine readiness for aggression in the course of the day, season and weather, as well as various correlations which exist between singing and aggressive behaviour, territorial behaviour in relation to optical dummies and acustic dummies, inter-specie aggression and the role of the female in a territorial conflict situation. Also the practical utilization of acustic signals for proving the presence of various bird species is described, as well as for making estimates of the size of a bird's territory and its bounderies. The author then describes the mapping of a bird's territory and experiments with the use of dummies producing sound signals; also the repertory of bird singing of a particular bird specie and/or population can be recorded. From the point of view of animals which live wildly, the wide-spread use of various chemicals in the landscape is the most dangerous factor. This is especially true of birds of prey. Birds of prey cannot be effectively protected without at the same time conserving the biota in which they live. Only an ecological sound landscape can maintain or renew the bird of prey population.

628. HINTERMEIER, H.: Absolute Rarität: Der Rotkopfwürger (An absolute rarity: The Skrike) Naturwissenschaften im Unterricht, 29, 1981, No. 6, p. 179, 1 fig.

In the FRG, due to extensive changes which have occured in the environment, the Skrike is becoming a real rarity. In 1980 it was observed in the vicinity of the town of Steinbach during the summer. The decline in the population of a number of birds is the consequence of changes in the environment. Birds can serve as indicators of changes in the environment. The author describes the Skrike (Lanius senator), its way of life, food and also its biota.

629. HINTERMEIER, H.: Der Fischadler - vom Aussterben bedroht (The Osprey - threatened with extinction) Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 6, pp. 180-181. 1 fig.

The author reports on the incidence of the Osprey from 1900 until 1977 when the nests of this bird of prey were found and described. In 1979 one bird was shot near Rothenburg in the FRG. Especially fisherman and fish breeder hunt this bird, which they consider to be a food competitor for fish. This bird needs 300 to 500 grams of food a day, which represents only 1 % of the number of fishes found in a fish pond during the course of a year. Normal losses of fish due to disease represent 5 - 22 % annually. 60 % of the prey of the Osprey weighs less than half a kilogram and it is highly specialized as far as food is concerned. The author also describes the development of the population of this bird in other European countries. The Osprey is now seriously threatened and deserves full protection.

630. HINTERMEIER, H.: Der Rückgang des Rebhuhns - Tatsachen, Ursachen, Massnahmen. Eine Unterrichtseinheit zur gegenwärtigen Niederwildmisere (A decline in the population of the partridge - situation, causes, measures taken. A topic concerning current complications with small game).
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 1, pp. 9-23. 6 worksheets, 1 model for transparency.

A decrease in the partridge population is evident all over Europe; it is not the consequence of the flourishing of predators or birds of prey, but rather the outcome of changes in the environment. The author here provides the draft of a teaching lesson outline on this subject. To make his description more specific, the author cites statistics of partridge hunting since 1950. The numbers of killed partridges has decreased from one year to the next. On the basis of problem teaching the author recommends also a study of the problem of the Common buzzard as a bird of prey which specializes in small rodents and of the Goshawk as a possible regulator of the partridge population. The natural habitat of the partridge is disappearing and in large fields he is constantly being disturbed; hence there is an increasing shortage of proper nest sites and also an increasing lack of food (field crops tend to be "clean" due to the use of chemicals in agriculture). In conclusion the author discusses the possibility of coming to the aid of the partridge by increasing its population artificially (by breeding the birds and then setting them free).

631. HOURDRY, J.: Quelques aspects biochemiques de la métamorphose des amphibiens (Some biochemical aspects of the transformation in amphibians)
Biologie- Géologie, 68, 1981, No. 2, pp. 471-474.

The author discusses the gradual morphological and histological changes which occur in transformation in amphibians. He deals in detail with the cytological and biochemical modifications at the nuclear, serological, protein, haemoglobin, red blood cell, pigment and cellular levels, as well as with changes in the calcium metabolism and body covering. He comes to the conclusion that besides the morphological, anatomical, histological and cytological metamorphosis which takes place, also a biochemical metamorphosis occurs, which can be studied through the quantitative and qualitative variations of special molecules, studied with the most modern physical and chemical techniques.

632. LUCZAK, J.: Pająki polne i ich wykorzystanie przeciw szkodnikom roślin (Field spiders and their utilization against plant pests)
Biologia w szkole, 34, 1981, No. 3, pp. 148-151. 5 figs.

Not only monophages, but also polyphagous entomophages are important for reducing the number of plant pests found in field crops. In Poland 675 species of spiders can be found, belonging to 31 genera. Spiders live in all kinds of eco-systems and in different layers of the environment. They are the consumers of various invertebrates, especially insects, and they themselves are food for stronger and larger invertebrates and vertebrates. A study of spiders found in fields in the vicinity of Warsaw and Wroclaw have confired the variability of spiders, from a specie point of view, the frequency of some species and the species predominantly found in specific crops. The influence of pestacides on spiders heve also been studied. Spiders are more sensitive to pestacides than other plant pests, but they are also more resistent than other specie of predator insects. The long-term use of pestacides effectively eliminates spiders from field and orchards. Fields do not have their own specific spider fauna, because the spiders travel to fields from the surrounding eco-systems, such as the forests, meadows, fallow land, wooded strips and shrubbery. In the autumn spiders, migrate from the fields to the eco-systems found in the vicinity. When the weather changes these migrations can take place at any time of the year. Spiders which "fly" on their spider-web fibres are called "aeronauts" and belong to the Linyphiidae family. They "fly" both in larval and adult forms. Others, such as representatives of the family Thomisidae or the family Lycosidae "fly" only as adults. In conclusion the author stresses that spiders are an important component in the struggle against insect pests. Those spiders which run on the surface of the soil are more important for combating pests than spiders which catch their prey into spiderwebs.

633. SANDNER, H.: Rola owadów i entomologii w życu człowieka (The role of insects and entomology in the life of man)
Biologia w szkole, 34, 1981, No. 3, pp. 131-136.

Insects represent 75 % of all animal species known today and some specie of insects have huge populations. From the phylogeny point of view they are the most successful evolutionary branch of invertebrates, just as mammals are among the chordata. Insects live in all kinds of environments and form a morphologically uniform group with an unusual variety of adaptation abilities in relation to various kinds of living environments. They live in terrestrial, as well as aquatic environments; they have a highly varied diet (hardwood, horn, wool, bookcovers), but the food of the majority of insects are plants (they are phytophagous). Also predator insects exist. The changes which man brought about in the landscape have formed new food sources for insects. They have become an important pest attacking crops and food stores, as well as livestock. Fields form specific eco-systems, called agro-ecosystems which contain varied biocoenoses suitable for insects. By destroying the natural enemies of insects, man has accelerated the largescale incidence of insect pests, which annual destroy approximately 10 % of the harvest, representing food for millions of people. For instance in Europe insect pests destroy annually 15 million tons of sugar beets and worlvide 23 million tons. The Potato bug destroys only in Europe annually 17 million tons of potatoes. Similar destruction also occurs in orchards, meadows and pastures and insect pests in forests are becoming an even greater menace. Chemicals are used against insect pest. If insecticides were no longer used, the damage done by insects would increase by at least 30 %. Thus the use of chemical insecticides saves over 20 % of all crops cultivated throughout the world. The problem with chemically combating insects is the fact that the insects in question very quickly adapt to the substances used and resistant strains develop, which then tend to proliferate. Insects are also important as the transmitters of infectious disease and as parasites. Insects transmit meningitis, yellow fever, filariasis, kala-azar and leishmaniasis, etc. On the other hand there are also useful insects, such as ants, beetles, Ladybird beetles, etc. Some types of useful insects can be used to combat insect pests.

634. SCHMIDT, H.: Warum singen die Amselmännchen im Frühjahr ? (Why do male blackbirds sing in the early spring ?)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 5, pp. 129-134 . 1 tab., 4 figs.

The author discusses the problem of causality, function and finality on the basis of a recommended research project which aims at determining why male blackbirds sing in the early spring. Finality aspects lead to a teleomatic, teleonomic or teleological explanation. From these points of view the author discusses acustic signals produced by the blackbird throughout the year and describes the external and internal factors which influence these signals. In a model of the blackbird made during classwork, the possibility of a simultaneous period of daylight and period in which male sex hormones are produced are considered. The outcome is a graphical representation of annual singing activity by the blackbird - an actogram. During the whole year the blackbird produces warning signals (an approaching cat or other enemy), warnings of predators (an airborne enemy, hatred calls (against owls)), general calls as an expression of excitment, and sounds connected with a scare. When the blackbird is nesting, there are calls for food, sounds expressing a good mood, courthip sounds, etc. All these sounds are invorn and have a fairly stable sound spectrum. However, among male blackbirds the variability of the sound produced is much greater, including the sound produced by individual birds. Blackbirds bred in isolation produce their own song compositions.

635. TREITZ, P.: Das Rauchschwalbe - "Vogel des Jahres 1979" (The Swallow - the "Bird of the year 1979")
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 5, pp. 155-156. 1 fig.

The author describes the Swallow, its biology and where it is found. In recent years its population in the whole of Europe has been decreasing. This is caused by the use of chemicals against insects. The author recommends various measures which will maintain and increase the population of the Swallow and/or the House martin which is more plentiful. Both Swallow and House martin are colonial nest builders; it is best to place a board under their nests so that their feces are collected. House martins nest on the walls of houses on the street, where their nests are threatened by traffic and the vibration of walls caused by heavy lorries, which may cause the falling of nests.

15.3 The biology of man

636. BAUMANN, K.: Intersexualität bei Menschen (Menschliche Zwitter) (Intersexuality in humans - human hermaphrodites)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 2, pp. 52-57. 8 figs.

The author describes the problem of intersexuality in humans. A hermaphrodite (or intersexual person) has sexual characteristics belonging to both the male and the female sexes or else characteristics which lie in between both. A special case is a true hermaphrodite, who has the sex glands of both sexes. The author describes how intersex develops in comparison to normal sexual differentiation. Genetic (chromosomal) sex is determined by the way in which sexual cells are combined. Sex is determined by sexual chromosomes; a male has XY sex chromosomes, while a female has XX chromosomes. The author also discusses estrogene and testostrone and sex hormones, as well as chromosomal abbrations (Turner's syndrome, Klinefelder's syndrome, the phenomenon of gonadial intersex in true hermaphrodites, hormonal intersexuality, feminization in men and intersexuality in women). In conclusion the author also discusses intersexuality in various animals, changes in sex which occur during a lifetime, the lateral hermaphroditism in butterflies and other related problems.

637. DUBININ, H.: *Biologichnoisotsialno unasledyavane* (The biological and social prerequisites of development) Biologiya i khimiya, 24, 1981, No. 5, pp. 4-19.

We should distinguish the dual essence of man: the biological which depends on heredity and the social, which depends on the environment. In this context a new term has come into use - socio-biology. The author discusses the relation between heredity and the environment which together form a new individual in the course of his ontogeny, as well as the phylogeny of the human race and which contribute in varying degrees to his mental and physical characteristics.

638. YURKOVSKAYA, V.Z.: *Vozniknoveniye roda Homo i ranniye etapi jego evolyutsiyi* (The development of the genus Homo and the early stages of his evolution) Biologiya v shkole, 55, 1981, No. 2, pp. 21-24.

The author presents contemporary opinion concerning the stages of evolution of the hominides:

1. The precursors of man (australopithecus, protanthropus)
2. archanthropus
3. paleoanthropus
4. modern man (neoanthropus)

As far as the 1st stage is concerned, the author refers to her article "Modern ideas concerning Australopithecus", published in Biologia v shkole, 1976, No. 2. She then deals with findings concerning the 2nd stage (Homo erectus) - since 1893 called Pithecanthropus erectus - up to the sicties and seventies (findings in Tanzania 2.6 million years old). Its human characteristics are stressed:

- making of complicated stone implements,
- using fire
- making weapons for complex forms of hunting
- erect movement exclusively on feet
- making artificial lodgings
- the development of the brain (with a volume of 1000 cm^3) - the beginnings of notional thinking and articulated speech
- improvements in the functioning of the hand.

639. KAISER, H.: Zur objektiven Dialektik von Biotischen und Gesellschaftlichen in der Ontogenese des Menschen
(Concerning the objectively existing dialectics of the biotic and the social in human ontogeny)
Biologie in der Schule, 30, 1981, No. 10, pp. 401-409.

Human ontogeny is the outcome of a development process which begins with the fusion of the nuclei of a sperm and an egg. In its essence, it represents the beginning of the process of maturity of a social being - a man. The author first discusses the genetic potentialities of man, which are the outcome of karyogamy, are subject to the laws governed by the genetic code and have developed historically. This is analysed in detail. He then goes on to discuss the relation between the genetic program and the social factor in ontogeny. The social factor is represented by the material and spiritual values created by mankind. The effectiveness of the social and genetic factors in the ontogeny of humans is then discussed as well as the fact that the biotic factor is primary in the development of an individual, while social factors are secondary. In conclusion the article deals with the variability and continuing reproduction of biotic and social factors in the development of an individual human.

640. KIRCHSHOFER, R.: Aggression als Forschung und Unterrichtsthema. Informationen und Materiallen zu einem ZOO-Lehrweg (Aggression as a research and teaching topic. Information and material for a science excursion to the ZOO)
Der Biologieunterricht, 17, 1981, No. 1, pp. 28-71.
16 figs. 7 worksheets.

The increasing brutality of mankind, terrorism and the threat of war with unforeseeable consequences have generated a need for the scientific study of human aggression. This problem is becoming decisive for the very existence of mankind and has serious social and political aspects. The study of the ethology of the higher vertebrates is important for a study of human ethology and human aggression. On the basis of specific examples, the author describes the varied types of aggressive behaviour found in man and animals and acquaints the reader with basic ethological terms used in this context. Man, in contrast to other animals, has no defensive mechanisms, so that murder is constantly carried out (in the

West someone is murdered every 20 seconds), as well as acts of terrorism and wars in which people are killed by members of their own specie. According to the aggression theory expounded by K. Lorenz, man has during his history brought about the extinction of extra-specie enemies (large predators) and now is himself becoming the victim of aggression in wars which have no biological function. Also a frustration theory of aggression exists, which derives aggressive behaviour from feelings of frustration in childhood. A different theory claims that aggression is acquired only through learning, especially at an early age. Also intensive studies are taking place concerning the physiological aspects of aggression and methods are being sought to influence educationally the causes of aggression. Pupils of course like aggressive behaviour and seek situations which lead to the rise of aggression.

641. MacLEAN, N.: Haemoglobin - A Model Molecule
Journal of Biological Education, 15, 1981, No. 1,
pp. 10-14, 5 figs., 4 tabs.

Haemoglobin has always held a special place in the interests of biologists and bio-chemists. Not only is it important for the physiology of respiration and its connection with numerous diseases, but also because thorough knowledge of its structur and functions provides the foundation for solving a number of other problems. In this article the author discusses haemoglobin from three points of view which are all based on the latest scientific findings: the structure of haemoglobin from the point of view of its function, the molecular genetics of human haemoglobin and the discontinuity of globin genes. Tables provide surveys of the bio-chemical aspects of the problem, as well as those of molecular pathology.

642. MAHADEVA, M.N.: The Relationship of Human Behaviour to Population Growth Curves
The American Biology Teacher, 43, 1981, No. 3, pp. 136--140. 1 fig.

A biologist from India here discusses various aspects of the fact that the human specie from its beginnings is constantly increasing in numbers and is now found in all parts of the world. Its growth is still continuing. The cause of this cannot be found in DNA molecules, but rather in the inborn ability of man to expand and to extrapolate a given environment on the basis of his genetic code. To this must be added the cultural factor as a sum of phenomena such as speech, language and other products of human thinking which have an effect on the qualitative development of the human specie. In his comments of the future of mankind, the author arrives at world-wide universalism and the need for cooperation, which would supercede local interests and competitiveness based on local needs which does not take into consideration the needs of the whole planet.

643. NOVOTNÝ, I.: Současný přírodovědný pohled na nervovou činnost - I. (A contemporary natural science survey of the nervous system - I.)

Přírodní vědy ve škole, 32, 1980-1981, No. 5, pp. 162-164.

Scientific endeavours in a number of fields have led to our present knowledge which approaches nervous activity as very complex biological process. The author of the article provides a survey of the knowledge achieved by previous studies and the advances made in this area. The main principle which is implemented in modern natural science research is the principle of evolution. The uniformity of animals which is the outcome of the evolutionary process, provides the opportunity to make use of the nervous system of lower animals as models for the study of various nerve processes which occur in the whole animal kingdom. The key to understanding and studying nerve activity is the nerve cell or neurone. Each neurone represents an independent functional unit, which is specialized for the reception, processing and output of information. These qualities of nerve cells also represent the basic activity of the whole nervous system. The basis for excitation are special characteristics of the nerve cell membranes, which are manifest in various electrical processes. The basic electrical property of cells is the fact that their surface cytoplasmatic membrane is polarized. The distribution of an electrical charge across the membrane causes the development of a difference in electrical potential, which is called the membrane resting potential. Action potential is the electrical signal produced by the nerve cell. The place where two neurons connect is called a synapse. Animals at various stages of phylogenic development have variously developed nervous systems. New opportunities for the development of the nervous system appeared with the development of animals with a bilaterally symmetrical structure of the body. Vertebrates have most complex structure of the nervous system. Development has so far culminated in the six-layer hemisphere cortex found in mammals and man.

644. NOVOTNÝ, I.: Současný přírodovědný pohled na nervovou činnost - II. (A contemporary natural science survey of the nervous system - II.)
Přírodní vědy ve škole, 32, 1980-1981, No.6, pp. 202-203.

A large portion of nervous processes occur as reactions to stimuli from the outside world. These reactions include those which are congenital and those which have been acquired. The connections between the secondary organ, the nerve centre and the performance organ (a muscle or gland) are called reflex paths. The transmission of a signal over such a path is called a reflex. More complex reflexes can be expressed on the basis of the following outline: stimulation - integration - reaction. Reflexes which occur on paths formed on the basis of genetic information are called non-conditioned reflexes. Instinctive behaviour represents a more complex form of congenital nervous activity. Each individual can form new reflexes, which are not common for all individuals, but only for those who have participated in the same experience; these are called conditioned reflexes. Memory plays a special role in the forming of conditioned reflexes. Man is the object of all human endeavours and hence also the human brain is the object of research concerning nerve activities. The human brain contains nerve processes which an be observed in animals. On the other hand, however, some nerve processes have specific properties in man (for instance emotions) and some are uniquely human (such as abstract thinking). In spite of the undoubted success achieved in studies concerning nerve activities, science has no yet succeeded in forming an integral concept which would explain exactly how the brain guides the activities and behaviour of animals and man.

645. STRAUSS, W.: Aggressionstheorien - eine Zusammenschau. (Aggression theory - a survey)
Der Biologieunterricht, 17, 1981, No. 3, pp. 2-26.
2 figs.

Human aggression continues to be an interesting subject of scientific study. A number of theories exist, which have attempted to explain human aggression. In

1973 the British zoologist R. Hindt attempted to put together various theories into a pluralistic concept which stressed the need for interdisciplinary work in this area. Here the author provides information on various theories concerning this subject, points to their positive and negative aspects and also provides an outline for teaching on this subject in secondary school biology courses. The term aggression has not yet been defined in a satisfactory manner, because most definitions do not take into account human interaction. The author describes the teories of a number of scientists: MOWRER, MILLER, SEARS - 1939 and their so-called frustration theory, the physiological theory of aggressive behaviour by MOAER, 1976, which seeks the main causes of aggression in problems connected with the acquisition of food and reproduction and in changes affecting the sensitivity of our neural systems. FREUD formulated a theory of instincts, but there are difficulties in its application, the definition of various instincts is insufficient and also their hierarchy has not been defined. FROMM in 1977 identified aggression with destructiveness. K. LORENZ explains aggression on the basis of human ethology and BERTALANAFFY in 1970 uses a system theory to explain aggression. Aggression should not be interpreted as instinctive behaviour. Aggressive activity occurs in interaction among human individuals, groups or social groups. Suggestions have been made to define aggression as anti-normal behaviour. But the criteria for judging individual types of aggression have not yet been developed. The author also expresses his disagreement with instinct theory and environmental factors as the cause of aggression, as well as with some of the opinions expressed concerning congenital and acquired forms of aggression. Exogenous and endogenous factors will continue to be a subject of study in relation to human behaviour.

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646. VODDE, J.: Geschlecht und Geschlechtsverhalten aus humanethologischer Sicht (Sex and sexual behaviour from the point of view of human ethology)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 4, pp. 103-107. 4 tabs.

Research findings indicate that already among the primates there are differences in sexual behaviour. The author then describes differences in sexual behaviour found among Eskymos on Greenland and bushmen from the Kalahari desert in Africa. He also discusses aggressive behaviour and socialization. A comparison between the function of sexual behaviour in man and in the European raindeer is very interesting. Differences between the behaviour of different sexes in man have a long history.

15.4 General biology, genetics and macro-molecular biology

647. ČAMK, J.: Podstawowe nurty i problemy biologii wspólczesnej (Basic trends and problems of contemporary general biology)
Biologia w szkole, 34, 1981, No. 1, pp. 15-22.

The author analyses the status of general biology at present and points to its basic problems. Among these, in the author's opinion, are the theory of biogeny, bioevolution, cellular theory and the theory of the hierarchy of organisms (increases in the degree of complexity and quality of organization), as well as the theory of integration and regulation, the dynamics of life processes, homeostasis and dynamic equilibrium, the theory of the function of nucleic acid and the genetic code, the theory of the function of connections between parts in relation to causative and limiting factors and the theory of the complementarity of organisms and the environment and the unity of the biota and the biocoenoses. The author analyses in detail the most modern versions of all these theories.

648. DIMITROVA-IVANOVSKA, N.: Simbioze pri mikro-organizmite (Symbiosis in micro-organisms)
Biologiya i khimiya, 24, 1981, No. 6, pp. 1-6.

All types of symbiosis can be divided into two basic categories: ectosymbiosis and endosymbiosis. In ectosymbiosis the microorganism is outside the cells of its host, while in endosymbiosis it lives inside the cells of its host. The mutual dependency of both symbionts can vary - from mutualism to certain forms of parasitisms. Symbiosis can be elective or obligatory. In the course of evolution it often happens that one of the symbionts takes on the function of the environment and provides protection, nutrition, perception and status for the other symbiont. The article provides examples of various types of symbioses, especially among bacteria. These relations are very important in assessing the development of life on Earth. They can also be made use of in the food processing industry, in agricultural microbiology and in diagnosing some infectious diseases.

649. FOX, S.W.: From Inanimate Matter to Living Systems
The American Biology Teacher, 43, 1981, No. 3, pp. 127-135. 4 figs.

The author, who is an outstanding American biologist, here offers comments on the development of living systems from inanimate matter. He sums up existing scientific hypotheses on this problem, among them the theories of the Societ academician A.I. Oparin, who several months before his death dealt extensively with this problem. Fox describes several very recent experiments on this subject and describes the path which leads from a protocell to a modern cell. He also discusses whether or not we can expect to produce "synthetic" life and comments critically on the creationist version of this problem.

650. GEISSLER, E.: *Zum Missbrauch molekular- und zellbiologischer Erkenntnisse. Fakten und Fiktionen*
(Concerning the misuse of knowledge in molecular biology and cytobiology. Facts and fiction)
Biologie in der Schule, 30, 1981, No. 7-8, pp. 275-281.

Molecular biology has undergone a stromy development. The universality of the genetic code has confirmed the correctness of evolutionary theory. Scientists have been successful in isolating and synthesing individual genes, genetic engineering has greatly advanced, DNA maps have been made and the DNA molecule has been successfuly recombined and proof provided that the gene structure of procaryote cells and their viruses differs from the gene structure of eucaryote cells and their viruses. Mammal genes have been isolated and introduced into the bacterium Escherichia coli, which is thus forced to produce human insulin or interferon. Experiments are under way with anti-bodies for the flue and hepatitis B. All this howver, has its worldview consequences, since man is capable of creating entirely new organisms, which would never have evolved in nature. Eucaryote cells can now be newly programmed and the first experiments undertaken with therapy at the gene level have already been successful. Also three DNA viruses have been isolated, which cause malignant cancer. It is now possible to combine the cells of various species, genera, families, orders, classes and even phyllums. Cloning has also been accomplished, which makes it possible to obtain individuals of identical genotypes. A number of comments have been made concerning the possibility of misusing cloning techniques (for instance for the breeding of "geniuses" and other specialists). In conclusion the author points to some of the potential and real dangers which follow from these experiments.

651. KASPAR, R.: Das Werden lebendiger Ordnung. Von der synthetischen Theorie zur Systemtheorie der Evolution
(The development of a life order. Concerning a synthesis of evolutionary systems)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No.11, pp. 321-331. 4 figs.

Charles Darwin´s classical evolution theory has been gradually extended by the findings of genetics (especially population genetics) and ethology. The modern version of evolutionary theory is actually a synthesis. Its basic concept concerns the influence of the environment, natural selection and mutations on the process of evolution. This theory assumes that causality is linear. In other words the theory rests on a simplified linear causality. It is not, however, capable of explaining in a satisfactory way a number phenomena which are important from the point of view of evolution, such as the problem of homology, order in living nature, the development of complex organs in living organisms (for instance the eyes of vertebrates), etc. With the exception of mutations and natural selection the theory does not take into consideration any other factors. The author cites various trends in the history of biology, which attempted to solve the problem of the development of order in nature, such as Bergson´s elan vital, Drieschov´s entelechia, H. Conrad-Martius' energy-specie logic, and provides the outline of the modern approach to evolution. Already J. Goethe guessed the fact that the causes of evolution are in the organism itself (esoteric factors), which are often more important than exoteric factors, provided from the outside. According to the new theory, selection is a factor which acts not only from the outside, but also from within, often to a stronger degree (the mechanism of internal stabilization of an organism, the hierarchy of an organism's genetic system, synorganization leading to a hierarchy of genes). Modern theory also makes it possible for instance to understand the shorter time needed for the evolutionof individual organs within the framework of a systematic unit.

652. KUBIŠTA, V.: Jednota života na Zemi (The unity of life on Earth)
Přírodní vědy ve škole, 32, 1980-1981, No. 7, pp. 242-244.

Already Friedrich Engels declared that life is nothing but a form of the existence of proteins. The proteins found in all organisms are formed by the same 20 aminoacids and are structured on the same principles. The basic type of links between aminoacids are peptide links. The primary structure of a protein is determined by its sequence of aminoacids. Protein fibres also form secondary structures. So-called tertiary structures are determined by the spatial ordering of individual sections of a protein molecule. When a permanent breakdown of the secondary and tertiary structures, which are relatively instable, occurs, proteins lose their biological characteristics, such as their enzymatic effect(for instance the denaturation of proteins be heat). Nucleic acids are another important group of macro-molecular substances. Nucleic acids are the carriers of genetic information and the genetic code is also universal for all organisms. Nucleic acids also have secondary structures, for instance DNA forms the famous double helix. A clear unity of structure and function can be observed already in biologically important macro-molecules. The unity of the organism is manifest not only by the structure of its basic chemical components, but also by the great similarity of basic metabolic processes. Thus for instance the universal intercellular transmitter of energy is adenosine-triphosphate (ATP), which is found in all cells. The cell itself is a universal structural unit which is capable of living independently. No living system can be a closed system, entirely isolated from its environment. The cytoplasmatic membranes of all cells have developed transmission systems, which enable nutrients to enter the cell. The continuing existence of life on Earth is possible only because all cells have the ability to grow and reproduce.

653. MÜLLER, D.G.: Relative Sexualität, eine Fehldeutung ?
(Is relative sexuality a mistaken concept ?)
Praxis der Naturwissenschaft - Biologie, 30, 1981, No. 3, pp. 82-88. 8 figs.

The German biologist M. Hartmann developed a theory of relative sexuality which was elaborated by F. Moevus. According to this theory every sexually differentiated organism, as well as every sexually differentiated gamete have at the same time the complete foundations for the opposite sex; in other words in spite of one-sided sexual differentiation, this differentiation is not absolute, but only relative. Precise proof of this theoretical idea has provided only in the case of the marine brown algae Ectocarpus siliculosus in Naples in 1925. However newer observations and experiments have not confirmed the theory of sexual relativity, even for this algae. It was found that in the original experiment the material available was not homogenous. Work with homogenous material showed that Hartmann's theory of relative sexuality is not valid.

654. GUERVIN, C. - LE COCO, C.: *Chromosomes métaphasiques et caryotypes* (Metaphase chromosomes and karyotypes)
Biologie-Géologie, 68, 1981, No. 2, pp. 354-359. 2 figs., 2 tab.

The traditional criteria for defining a specie are similarity and mutual fertility. Among the signs now studied are karyological characteristics, especially related to chromosomes, since its seems that by their study information can be gained concerning both aspects of the above cited definition. The authors suggest the study of the chromosomal structure of two species (Callisia elegans and C. repens) which are closely related; they are suitable for this purpose because of their numerous chromosomes and large size. They describe in detail the preparation of the experimental material and the techniques used in the experiment itself, which include a preliminary analysis of each chromosome. The outcome of the experiment are tables which compare six pairs of chromosomes of both studies species.

655. MILEVA, V.: *Genno-inzhenerstvo - sshchnost, problemi i perspektivi* (Gene engineering - its essence, problems and outlooks)
Biologiya i khimiya, 24, 1981, No. 3, pp. 4-9, and 45.

Gene engineering in the most general sense of the word means acquiring molecules with contain new genetic information, in other words with a re-combined molecule, as the outcome of hybridization in vitro among fragments of DNK from different organisms. These fragments are the carriers of one or several genes. The aim of this discipline is to achieve genetic structures or whole organisms with new hereditary properties. The technology of these procedures have the following characteristics:

1. the isolation of the relevant DNA fragment and its transformation to a vector capable of independent replication,
2. obtaining a recombined molecule,
3. the introduction of the hybrid molecule into the cell,
4. the selection of cells which have accepted the recombined molecule.

The author also deals with the question of the practical application of this new scientific field, especially from the point of view of livestock breeding, the cultivation of crops, in ecology and also in human genetics.

656. STACKEBRANDT, E.: Neue Aspekte zur Evolution der Zelle (New aspects in cell evolution)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 11, pp. 331-342. 5 figs.

In recent years the comparative study of macro-molecules has radically changed our knowledge concerning cell evolution and the phylogeny of organisms. This is especially true of a comparative analysis of some ribosomal RNA micro-organisms, which in the final analysis have proved to be the most suitable markers of evolution and for which palaeontology in view of their size cannot bring any findings. These ribosomal RNA organisms are very wide-spread in living organisms: their genes do not participate in any genetic exchange, their molecules are sufficiently functional, and substitution by mutation takes place very slowly, so that it is possible to distinguish large geneological distances. Distinguishing the sequence of molecules in these ribosomal RNA organisms is simple. At present the 16 S r RNA with 1540 nucleotids is considered to be the most suitable marker. A comparative analysis of the sequence of its oligonucleotids has proven to be best for discovering the degree of relatedness of even very distantly related organisms. On the basis of a large number of studies in this area in the period 1977-1981 the author describes the most recent findings concerning the development of the three proto-phylums from a common ancestor approximately 3.8 to 4 billion years ago. One line of development led to the eubacteria, another to archeobacteria and another led to the forming of cytoplasma and nuclei and to the eukaryonts. The author then develops his own opinions concerning the phylogeny of eubacteria, gram-positive bacteria, gram-negative bacteria, blue-green algae, archeo-bacteria, etc. He demonstrates the use of a coefficient of similarity S_{AB}, whose value is between 1.0 and 0.03 and is used for comparing evolutionary time with geological time.

657. VREDEVELD, G. - VREDEVELD, R.: The Galapagos - A Laboratory for Evolution
The American Biology Teacher, 43, 1981, No. 4, pp. 201-204. 1 tab.

1979 was the 120th anniversary of the publication of Darwin's famous book "On the Origin of the Species". The husband and wife team of the authors, who are both biology teachers, in this article use the occasion to criticize existing conditions in biology instruction in some states in the USA, where opinions have been heard in favour of creationist theory and a rejection of evolutionary theory. Together with Darwin they cite the Galapagos islands as an example of the validity of evolutionary theory; they enumerate ecological factors which also provide numerous examples of evolution. In spite of the fact that this article provides only an outline of the problem, it is a valuable contribution to the struggle against those Americans who are against Darwin's theories.

15.5 Medicine and health-care

658. ALTMANN, A.: Imunologická schopnost organismu
(The immunological ability of the organism)
Přírodní vědy ve škole, 32, 1980/1981, No. 10,
pp. 371-372.

The immunological system of vertebrates is capable of distinguishing various antigenes (viruses, bacteria, parasites, chemicals, drugs). Antigenes are formed by compounds - determinants. The elements of the immunological system include immunoglobulins, which are found in lymphocytes. Two main types of immune reactions exist: a humoral reaction and a cellular reaction. The memory of immunoglobulin is explained by clonal theory, according to which part of the lymphocytes in a body do not participate in the destruction of antigenes and in fact represent the memory of the organism as far a specific antigene is concerned.

659. BAUMANN, K.: Physiologie der Emotionen (The physiology of emotions)
Praxis der Naturwissenschaften - Biologie, 30, 1981,
No. 6, pp. 166-171. 2 figs.

The author discusses contemporary opinions concerning emotions, which can be observed at three different levels: the physiological, ethological and affective. The article deals only with the first of these, the physiological aspect. Both from a physiological and ethological point of view emotions are manifest at the motor level, while the affective aspect is verbal. Special attention is devoted to the emotion of fear. In the USA 5 % of the population, or 10 million persons suffer from fear. In humans, fear is manifest by pulse acceleration, a feeling of weakness, dryness in the mouth, sometimes shivering, sudden urination a bowl movement and vomiting. It is accompanied by symptoms of physical exhaustion and changes in the activity of the autonomous neuro-vegetative system. During fear, increased amounts of lactic acid are found in the blood and infusions of this acid can artificially cause feelings of fear in many people. Fear is also influenced by salt and sugar solutions. Symptoms of fear also appear when there is too little calcium in the blood. The surplus production of lactic acid is caused by adrenaline. Also doses of adrenaline increse feelings of fear. The author describes the chemical aspects of fear and the theory formulated in this context by Lader (1974). In fear neurosis the cortisol level in the blood is increased and an intravenous injection of hydrocortisone will cause an increased propensity towards fear. This involves adrenocorticotrophic (ACTH) and corticotrophin releasing hormones. Modern findings of this type have been utilized in medicine.

660. BENDER, A.E.: Hooked on Sugar
The School Science Review, 63, 1981, No. 223, pp. 247-251.

The sweetening of foods and beverages is to a great extent the result of habit. By sugar, we usually have in mind cane sugar or beet sugar, but other sugars exist, for instance the monosaccharides (glucose and fructose) and the disaccharides (sucrose and lactose). The disaccharid sucrose (or saccharose) is made of glucose and fructose. In the process of digestion it is broken down into these simpler sugars. Starch is one of the polysaccharides, and is one of the a main components of human food. Maltose (a disaccharide) is made of two molecules of glucose. Sucrose is the most important sugar in human food, but this has not always been so. The widespread use of sugar began only in the last century and consumption has increased from 2.5 kg per capita to 55 kg per capita annually. One fifth of all consumed calories are now provided by sugar. But sugar is not an essential food component, there are people who consume no sugar at all and are absolutely healthy. Sugar also does not contain any minerals or vitamins. It is now extensively used in the food processing and canning industries (for making tinned fruit, marmelades, etc.). Sugar also has negative effects on human health, it causes tooth decay and is a source of "empty" calories, because its assimilation by the body requires the presence of vitamin B and mineral salts; because sugar is a concentrated form of calories it leads to the overloading of the body with calories. Diabetes seems to be a hereditary disease. The excessive consumption of sugar is also related to the incidence of myocardial infarctus. Experiments with volunteers have shown that those people who have a minimum sugar intake in their diets have fewer infarcts. Now various artificial sweeteners such as saccharin, cyclamate, espartem and thaumatin are made for those who have diabetes or those who are trying to lose weight and thus reduce the amount of sugar they eat. The author recommends decreasing the amount of sugar we consume in the interests of good health. Children should recieve candy only one a week and immediately after a meal. Also sweet soft drinks should be limited in use, as well as the use of sugar in coffee and tea, etc.

661. BLAU, H.J.: Blutkrebs im Kinderalter - aktuelle Behandlungsergebnisse und Probleme (Cancer of the blood in childhood - current outcome of treatment and problems)
Biologie in der Schule, 30, 1981, No. 12, pp. 533-536.

The problem of cancer of the blood in childhood has been a subject of study at the Teaching Hospital in Rostock for a number of years. Until the middle of the sixties, leukaemia was usually fatal, while today 50 % of the childpatients have survived for more than 5 years. Various types of cancer are found in 10 out of 100 000 children; of this number approximately half are cancers of the blood and 40 % are acute lymphatic leukaemia (which is the second most frequent cause of death among children, after accidents). In the GDR there are anually 500 new cases of cancer among children and of this number 150 - 200 have cancer of the blood. The author describes the therapy used in cancer of the blood and the psychological and educational aspects of the disease. The disease is manifest by changes in the blood count, pain in the joints and bones and swelling of lymphatic nodes, the spleen and the liver. The most important therapy is intensive cytostatic treatment. Teachers should help such children as much as possible.

662. EISENBLÄTTER, D.: Werden Herz- Kreislauf-Krankheiten häufiger ? (Will circulatory disease become more frequent ?)
Biologie in der Schule, 30, 1981, No. 12, pp. 531-532. 1 fig.

We often read about the increasing number of circulatory diseases, especially among young people. The question is, whether such claims are justified. This problem is studied on an international scale and since 1974, mortality due to heart disease, especially from ischemic heart disease, has been declining in the USA, as well as in Australia, Finland, Canada and Belgium. The reasons for this are not known. Of course only fatal cases are registered, and thus we cannot say whether the number of those with the disease has declined, or only the number of deaths. But in other countries, for instance in Sweden, the number of deaths from this cause is constantly increasing. In a third group of countries the situation remains without change - these include Sweitzerland, Austria, the FRG, Netherlands and Czechoslovakia. Increasing trends are found in Sweden, Denmark, France, Poland, Hungary, Bulgaria and Rumania.

663. FRÄNZ, J.: Genetische Aspekte der Krebserkrankungen und der Krebstherapie (The genetic aspects of cancer and cancer therapy)
Der mathematische und naturwissenschaftliche Unterricht, 34, 1981, No. 5, pp. 265-271. 5 tabs., 1 fig.

The author provides a survey of the current state of knowledge concerning cancer from the genetic point of view. Modern medicine now uses expressions such as congenital tumor syndrome, congenital developmental defects with increased cromosome instability and a propensity to form tumors, chromosomal pathies, tumors accompanied by chromosomal defects, gene mutations, tumors caused by a constant chromosomal abberation and tumors as the outcome of heredity caused by a monogene, etc. Specific families have a general disposition towards cancer. Cancer therapy includes surgery, radiation and chemotherapy with cytostatic drugs. Practically, all these measures are usually combined. Modern therapy, however, brings with it further problems with mutagennous negative side effects, which under certain conditions can even lead to secondary cancer. The importance of genetic factors in individual types of cancer is very complex. Tumors appearing in childhood have congenital as well as non-congenital forms. In the majority of cases the outbrake of cancer is connected with external factors (mutagens or viruses). The accumulation of cancer in some families and the incidence of cancer at a younger age indicate the co-action of genetic factors and environmental factors. Not everyone who comes into contact with mutagens and viruses gets cancer, which indicates a congenital disposition or the existence of congenital protective factors, which are probably decisive for the actual outbreak of the disease. The author acquaints readers with specific types of cancer and with new knowledge about them. Further information concerns the genetic effects of chemotherapy and radiation and their negative side-effects. This therapy concentrates on the activity of nucleic acid, the cell nucleus and the physiological centres of cellular activity. While the therapy destroys cancer cells, it also often kills normal cells and can cause their mutation.

664. Mit Krebserregern leben (Living with cancer-causing substances)
Naturwissenschaften im Unterricht, 29, 1981, No. 5, p. 153.

In the USA a new substance cause causing cancer has been found, called alfatoxin, which was found in peanut butter. This discovery should not of course lead to a prohibition of the use of peanut butter or of other peanut products. New carcinogenic substances are being constantly discovered as a consequence of improved methods of measurement. Some years ago the quantity of a substance detected in another substance was in the range of 1 part per million (in other words in 1 kg of food 0.001 g of the polluting substance could be traced, while now these substances can be determined in quantities of 0.000000001 g. Nitrites are carcinogenic (they are used in meat preservation), but they are also found in natural food, for instance in spinach. At present we are to, a certain extent, forced to co-exist with various carcinogenic substances. Only their large-scale ingestion is a dangerous poison for man. Safe threshold quantities of these substances should be determined.

665. VOGEL, G.: Zu dem Bericht: "Russe trug einen Zwilling im Brustkorb". Mainzer Allgemeine Zeitung 20.6.1980
(Concerning a news item: "Russian had twin in chest" - The Mainzer Allgemeine Zeitung, June 20th, 1980)
Praxis der Naturwissenschaften - Biologie, 30, 1981, No. 6, pp. 185-189, 4 figs., 1 copy of newspaper clipping.

According to the account published in the above mentioned newspaper, a Soviet citizen underwent surgery during which the remnants of the embryo of his twin was removed from his chest; this was a so-called parasitical twin. The author illustrates how such a news item can be used to teach a biology project concerning monozygotic and dizygotic twins, their development and the development of teratoma. The conditions needed for the development of twins are explained, the development of parasitical twins and the possibility of the need for surgery, which may even pose a threat to life.

666. WITKOWSKI, R.: Genetisches Erbe und Umwelt
(Heredity and the environment)
Biologie in der Schule, 30, 1981, No. 9, pp. 392-396.

Human genetics have undergone very rapid advancement in the last decades. The first Congress on Human Genetics was held in 1956. Disease and phenotype characteristics are not hereditary. Neither alcoholism, veneral disease or the polluted environment are the cause of genetic disease. Every person may have mutant genes, and this is especially true of autosome recessive genes. It is impossible to draw an exact dividing line between genetic and other diseases (for instance even infections have a genetic element). It is not true that genetic disease is incurable. The author goes on to deal in detail the treatment of genetic disease. Among diseases with monogene causation are mucoviscidosis and phenylketonuria, while diabetes and schizophrenia are typically polygene caused. Genetic disease is found in 1 % of the population, as are chromosomally caused syndromes which include Down's syndrome (mongolism). The author also discusses prophylactic measures related to genetic disease (genetic counselling).

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15.6 Agriculture and agricultural engineering

667. DORST, F.W.: Immer wieder Kummer mit den Tulpen (Always more wories with tulips)
Naturwissenschaften im Unterricht - Biologie, 29, 1981, No. 5, p. 153.

Tulips usually produce very good blooms for the first two years after planting the bulb, while in the third year, if they are left on site, they produce only small flowers or none at all. The reason for this is an exhaustion of nutrients, which are then in short supply for the forming of effective cellular juices which are needed to produce sugars, proteins and cellulose in sufficient quantities. Only during the first year do the daughter bulbs of the tulips have sufficient nutrition. The only thing to do is to move the bulb to a new site for another two years before moving it again. After the wilting of the bloom, the flower stem and ovary should be removed. Fertilization can sometimes lead to a shortage of the required nutrients.

668. FROMMHOLD, I.: Biologische Methoden in der landwirtschaftlichen Praxis zur Ausschöpfung des Ertragspotentials bei Getreide (Biological methods used in practical agriculture to increase cereal crops)
Biologie in der Schule, 30, 1981, No. 1, pp. 33-38.
8 figs.

The main aim of present day intensive crop production is a maximum crop of cultivated plants per unit of soil. However, the growth patterns of a number of cultivated plants have in the course of their phylogeny adapted to survival rather than to maximum yields. The problem of increased cereal crops requires the introduction of assimilated and their storage by the plants. For this reason research is concentrating on the better utilization of the plant's biological potential. The effectiveness of agglomeration type intervention no longer depends on the size of the plant, but rather on the biological conditions required by the plant at a given stage of development. A macro-phenological scale is used for this purpose or possibly in some cases a micro-phenological scale, which the author describes in detail. According to such scales, development is divided into 12 stages, which the author specifies. Pupils will be able to define a number of them.

669. KOWDA, W.: Über die Unersetzbarkeit der Bodendecke in der Natur (Concerning the irreplacability of the soil layer in nature)
Biologie in der Schule, 30, 1981, No. 2/3, pp. 55-58.

According to current ecological findings, the soil layer is irreplaceable. However, its quality is being constantly depleted. The soil ecosystem represents a mechanism which has an essential influence on the circulation of matter between the biosphere and the atmosphere and/or hydrosphere. Approximately one half of the substances out of which the biomass and biogenic energy of the soil-plant ecological system are produced are found in the soil. The humus layer has the function of an accumulator of energy from which it is allocated in the course of photosynthesis and which at the same time prevents the flooding out of important elements (C,N,P, S,K.Ca) into the oceans of the world. At present only 10 % of dry land is utilized and annually 6 to 7 million hectars of soil are lost. Industry has a negative effect on the soil, for instance sulphur and chloride compounds increase the acidity of the soil. The most important factors for improving agriculture are the use of fertilizers, land reclamation and irrigation. The too extensive use of fertilizers is harmful to the soil. Greater attention should also be given to industries with closed cycles (waste-less processes) and the recycling of waste.

670. NIKITENKO, E.L.: Zadachi i perspektivi razvitiya selskogo khozyastva na sovremennom etape (The tasks and outlooks for the development of agriculture in the present stage of development)
Biologiya v shkole, 55, 1981, No. 4, pp. 6-11.

While in former five-year plans the size of investments into agriculture increased, in the course of the eighties some of these investments will be paying for themselves and will lead to an increase in agricultural productivity. The main lines of development of Soviet agriculture were defined by the July plenary session of the Central Committee of the Communist Party of the Soviet Union (in 1978) and were again confirmed by the XXVIth Congress of the Party; intensification on the basis of mechanisation, the use of chemicals and land reclamation, the further development of livestock production (by 1985 18.5 million tons of meat, 99 million tons of milk and 72 billion eggs, as well as 480 000 tons of wool are to be produced), and an increase in cereal crops (to 243 million tons) were all stressed. In the course of 1980 and 1981 further partial measures were taken by the Party and Government for the fulfilling of these tasks.

671. TIMOSHISHIN, M.L.: Kormovaya baza - osnova razvitiya zhivotnovodstva (The production of fodder - the foundation of livestock production)
Biologiya v shkole, 55, 1981, No. 2, pp. 15-20.

The production of fodder is a very extensive term, it includes not only the growing of feed crops but also their processing, preservation and feeding to animals. Various components of animals' food should be scientifically determined (including the amounts of vitamins, amino-acids, minerals, etc.). By correct composition, the effectiveness of feed can be improved up to 25-30 %. Differentiated recepies, according to the age of the animals, are also important. Also the industrial production of protein and vitamin additives to feed should be developed.

15.7 Agriculture and zootechnological engineering

672. ANDRONOVA, Y.A.: Bolezni krolikov (Rabbit disease)
Biologiya v shkole, 55, 1981, No. 4, pp. 64-69.

The author describes in detail various infectious diseases which rabbits can acquire, as well as diseases caused by parasites. Also basic treatment and desinfection methods are described.

673. WAGNER, H.: Pheromone und ihre Anwendung in der Landwirtschaft zur Steigerung der tierischen Fleischproduktion (Pheromons and their use in agriculture to increase livestock procution)
Biologie in der Schule, 30, 1981, No. 5, pp. 215-218.
4 figs.

Olifactory and taste stimulation is very important for animals. A number of substances entice or repel.

According to Karlsson and Lüscher these substances are called pheromons which are in fact a medium of chemical communication among animals. They are highly effective. For instance a single molecule of bombycole leads to a nerve impulse in a silk worm. A large number of pheromons are found among insects, but they are also found among mammals (mice, horses, sheep, pigs). In boars such a substance was isolated in their testicles in 1944 in the form of a steroid which exerts a strong influence on the copulation behaviour of female pigs. The substance causes an unpleasant odor in boars, but the meat of such a boar contains less fat than the meat of female pigs or young pigs. The meat can be made edible and its smell done away with by a bio-synthesis of the pheromon, which the author describes. The copulation behaviour of female pigs is caused 20 % by visual stimulation (the shape of the boar´s body) and 80 % by the olifactory stimulus produced by the pheromon. For this reason its use is an important factor in artificial insemination.

15.8 Outstanding scientists, anniversaries, deaths

674. FRITSCH, K.: Lebenslauf (Curriculum vitae)
Praxis der Naturwissenschaften - Biologie, 30, 1981,
No. 12, pp. 354-356. 1 photo.

The outstanding ethologist Karl von Fritsch has written his own autobiography at the occasion of his 95th birthday. I can serve as source material for pupils preparing school reports on the development of ethology. He was born on November 20th, 1886 in Vienna. His father was a professor at the University. Since his early youth he was attracted to natural studies, and to animals, which

he bred and studies throughout his life. In 1905 he graduated from secondary school and at the wish of his father, who was a surgeon and urologist, he decided to study medicine. After completion of his 5th term he went to Munich where he studied zoology with R. Hertwig. In 1909 he returned to Vienna and began to work at the Biological Institute where his first research project concerned changes in the colour of fish.
In 1910 he received a doctor´s degree and became an assistant to prof. Hertwig at the Zoological Institute in Munich. By 1912 he was an associate professor of zoology and comparative anatomy. During World War I. he was a bacteriologist and worked for the Red Cross. In 1917 he married Margaret Moher, the daughter of a Viennese publisher, with whom he had 3 daughters and a son. In 1921 he became the director of the Zoological Institute at the University in Rostock, in 1923 he worked in Wroclaw, in 1925 he returned to Munich and in 1931-32 he founded a new zoological institute in Munich. In 1946 he worked in Steyer, in 1950 he again returned to Munich. In 1958 he began to study ethology. Among his most important ethological discoveries are bee dances, the way bees achieve spatial orientation, the colour sight of fish, specific substances found in the skin of fish as the result of fear and proof of the hearing of bees. The article also contains a bibliography and a list of the author´s memberships in various societies, his rewards and various honorary doctorates.

675. ŠVARC, J.: Za soudruhem RNDr. Josefem Vávrou
(In memory of comrade Dr. Josef Vávra)
Přírodní vědy ve škole, 32, 1980/1981, No. 6, p. 206.

In May 1980 Dr. J. Vávra, teacher at the department of natural sciences, geography and the foundations

Ol 490

of agriculture at the Pedagogical Faculty in Hradec Králové, died.

676. Zum 100. Geburtstag von Alexander Fleming (At the occasion of the 100th birthday of Alexander Fleming) Biologie in der Schule, 30, 1981, No. 9, pp. 391-392.

The name of Sir Alexander Fleming is connected with the advent of the era of antibiotics. In 1929 he discovered penicillin. He was born in 1981 in Ayrshire in Scotland, the son of a farmer. After taking a degree in medicine he began to work in bacteriology. During World War I he began to seek more effective methods of treating gangrene. Essentially he was looking for an organism which would act against another organism (antibiotic effect). Spores of the mold Penicillium notatum which fell by accident into a Staphylococcus culture openned the research of antibiotics. Fleming named the effective substance penicillin. In the period 1938-1940, E.B. Chain and H.W. Florey worked with him to determine correct dosages and to develop large-scale production methods of the new drug. In 1945 all three received the Nobel Prize. A. Fleming died on March 11th, 1955.

15.9 Scientific institutes

677. DABROWSKA-PROT,E. - LUCZAK, J. - BILEWICZ-PAWINSKA, T.: Aktualne kierunki badań entomologicznych w instytucie ekologii PAN (Current entomological research carried out at the Ecological Institute of the Polish Academy of Sciences) Biologia w szkole, 34, 1981, No. 3, pp. 182-184.

The Ecological Institute of the Polish Academy of Sciences is the largest research institution devoted to ecology in Poland. It has two independent departments and a number of scientific sections. It studies the botanical and zoological populations of biocoenoses and ecosystems found in Poland. One of its main spheres of interest are insects. Also bio-energy studies are undertaken, as well as the study of the quantity of food consumed by an individual of a specie, the influence of extending energy and the relation between extended energy, increases in the biomass of the body and various forms of activity, the energy found in feces and the total energy balance of various species. Among insects the main objects of interest are ants, plant lice, locust and beetles, as well as spiders. Orthoptera are an important object of study from the point of view of energy balances (this group includes important insect pests).Also Carabidae and some saprophagous insects are studies from the point of view of energy transformation. The genus Trichogramus, which is a parasite of insect eggs is studies from the point of view of its utilization to combat plant pests. Also insect communities found in various environments are studies. Among aquatic insects the family Chironomidae is of interest because of its influence upon the energy balance of the floor of water areas; another subject of interest are mosquitos, their seasonal changes, specie structure, dispersion and migration and their role in urbanized landscapes. Also phytophagous insocts are studied. The use of heteroptera from the family Nąbidae as regulators of the insect population in fields of grain, the natural resistence of cereals to insects, the importance of springtails (Collembola), of duoptera (both larvas and imagos) and of ant for the process of decomposition and the importance of various predator insects and ants, etc. are also studied.

678. MIKOLAJCZYK, W.: Polskie towarzystwo entomologiczne (The Polish Entomological Society)
Biologia w szkole, 34, 1981, No. 3, pp. 181-182. 1 fig.

The Polish Entomological Society is one of the oldest scientific societies in Poland. It was founded in 1923. Its purpose is scientific work in entomology, cooperation with foreign specialists in this field and bringing together all those interested in entomology. The Society has 800 members who are professionals in the field as well as amateurs; they belong to 17 different chapters all over Poland. Regardless of territorial division, its members also belong to various specialised groups which specialize in forestry entomology, agricultural entomology, insect communities, beetles, butterflies, duoptera, parasites, etc. The Entomological Society organizes international symposia, research and scientific work, exhibitions, courses, consultations; it also cooperates with biology teachers and helps in the organization of Biology Olympiads. The Society publishes a journal called Polskie pismo entomologiczne and also keys for identifying insects found in Poland, as well as popular magazines. The keys published by the Society already include over 30 000 specie of insects. The Society has a large library in Wroclaw.

Index of Authors with Number of Annotation

Aferina L.V. 175
Akhmadeyeva A.K. 177
Allen W.H. 268
Altmann A. 209, 210,269,309
467,468,469,470,565,658
Anders B. 386
Andronova J.A. 270,672
Angelova R. 340
Argaláč, K. 326
Arriel P. 509
Auramova E. 2
Bade, L. 211,486
Baer H.W. 157
Bagockiy S.V. 422
Bajan C. 584
Bajankina Z.V. 332
Balászová J. 341
Bandoly W. 510
Bardell D. 369
Bardot 400
Barker J.A. 610,611
Barman Ch.R. 167
Bartels A. 157
Bauer P. 212
Baumanov K. 636, 659
Baumgartner 528
Becker H. 178
Bockmann H. 37
Bell B. 31
Bender A.E. 660
Benson C.L. 213
Bentley I. 179
Bereucina L.P. 420
Berend M. 358
Bergmann H.H. 487, 621
Berquist B.L. 378
Bergstedt Ch. 180
Berkinblit M.B. 421
Berlińska B. 425
Betkowski 537
Białecka K. 401
Biolohlawek-Hübel,G. 434
Bilewicz - Pawińska T. 677
Binder K. 103
Bish C.W. 214
Blagosklonov K.N. 422
Boháč D. 379
Boháč I. 472
Bohme O. 104
Bojasiński T. 402
Boyadzhiyeva A. 32
Bossert W.H.
Bowker D.W. 216
Bozarov V. 7
Böhmer E. 425
Bradley J. 52
Brady J. 622
Breiding R. 217
Breitenmoser U. 66
Bretschneider J. 338
Brieme H. 67, 283
Broom D.M. 612
Brown C.E. 166,181
Brunovt J.P. 489,496

Brunovt U. 488
Brush S.C. 60
Buckel Ch.B. 271
Bukatsch F. 182,218
Burak L. 136
Burger A. 258
Buschendorf J. 332
Bybee R.W. 612
Carney G.C. 567
Cassele M. 511
Ciavatti A. 16
Ciavatti G. 16
Cichy D. 8,137,138,310, 349,435,546
Clarkson J. 183
Clausnitzer H.J. 219
Clifford P.E. 216
Coletta J. 52
Colova L. 32,292
Curieux A.L.
Czaja-Topińska J. 474
Czerski W. 498
Ćmak J. 647
Čeřovský J. 68
Dąbrowska-Prot E. 624,677
Danneci I. 436,437
Daumer K. 311
Daves J.A. 184
Daz R. 533
Deniciuk Z. 568
Dietrich G. 36
Dilkina B.J. 47
Dimova S. 473
Dobrowsky S. 490
Doussal 400
Downie R. 168
Dransfeld K. 105,512
Dreismann G. 185
Dimitrova Ivanovska N. 648
Dlugowiejska J. 353
Dorst F.W. 667 D
Dudová E. 321
Dufek F. 263
Dunda 387
Dussa U. 491
Dussart B.G.J. 350,569
Dylla K. 118,284,475,476
Einhellig J. 450
Eisenblätter D. 662
Eliáš P. 451
Erber D. 293
Epp G.J. 302
Eschenhagen O. 526
Evans D. 513
Falkenhahn H.H. 613
Fandray K. 547
Faragó L. 341
Fedorec G.F. 351
Fedorko A. 625
Fedorova V.N. 158
Feest J. 186
Fellars L.G. 187
Fels G. 6
Ficón D. 452
Fido N. 361
Fleischer H. 514

Fleischer J. 128
Foote M.A. 207
Fox S.W. 649
Franyo I. 17
Fränz D. 278
Fränz J. 563
Freeland P.H. 220
Frejlak S. 403
Friemann H. 70
Frileux P.K. 71
Fritsch H. 61,62
Fritsch K. 647
Fritsch R. 61
Fritschek D. 267
Frommhold I. 668
Fulton N.M. 373
Gagst S. 427
Galayeva A.M. 72
Ganěv Ž. 7
Gawłonska J. 418
Gärtner M. 404
Gebhardt R. 492
Gehlhaar K.H. 548
Gemeinhardt D. 3,39,342
Geisler E. 650
Georgiyeva P. 171,138,173
Genz A. 149
Genkova L. 389
Gill B.F. 295
Gill J. 188
Gizara J.M. 570
Globig H. 493
Goněva D. 58
Gospodar U. 222
Gottschlich G. 405
Grònke O. 180
Göckert G. 527
Götze G. 180
Graby R. 339,515
Graham W.S. 352
Graus A. 106
Grundberg U. 10
Guervin C. 654
Güttert E. 293
Haack G. 176
Haas G. 52
Hahn M. 107,261,494
Hagemann J. 516
Hamilton T.R. 272
Hamon H.M. 268
Hariová F. 73
Hartmann U. 314
Havláková 533
Hayddn H.L. 571
Heath M. 572
Hinzel I. 33,108,536,549
Hell H.W. 629
Hendrik 528
Herhaus K.F. 438
Herz W. 159
Hesse M. 160
Hetcheb G. 108
Hill E.G. 224
Hill - Cottingham M.P. 273
Hillmann H. 573
Hintermeier H. 74,477,628,629,630
Hirschmann W. 335
Hirsfeld D. 298

Hiszpańska B. 140
Hobbs A.P, 213
Hocke Ch. 39,534
Hofer K. 439
Hoffmann W. 497
Hollender F. 495
Hopf H. 225
Horn F. 153
Horník F. 40,517,550
Houfek J. 40,517,550
Houdry J. 631
Horvátová E. 344
Huber F. 226
Humpreys T.J. 406
Hunneshagen H. 315,329,518, 519
Chalašová J. 322,327
Chamdamova T.Ch. 496
Chassi G. 119
Choppin G.R. 75
Chripkov A.G. 120
Christov Ch.B. 76
Ignatowska J. 428,429
Ivanovič K. 64
Iwon W. 264
Jablokov A.V. 77
Jaenicke J. 299
Jamborova G. 17
Jäger R. 440
Jeník J. 574,575,576,577, 578,579,580,581
Johnstone A.H. 300
Juignet P. 582
Jiśkiewicz B. 453
Kabacik-Wasylik D. 363
Kabasanova M. 48
Kadiyev I. 375
Kadirova R.N. 357
Kadurina E. 121,173
Kafka J. 235
Kahle J.B. 539
Kaiser H. 639
Kajak Z. 583
Kalinova G.S. 161
Kalugin QA.I. 391
Kamenkina I. 78
Karatayeva N.B. 141
Karotkova I.S. 543
Kasper R. 651
Kaufmann M. 362
Keil W. 79
Keller H. 110
Kempe R. 316
Kendrick R.E. 227
Kilarski W. 561
Kintzel W. 41,154,409
Kirshofer R. 640
Klamm S. 221
Kleffmann S. 221
Klein I. 37
Klein S.J. 374
Klein U. 551
Klepel G. 329
Klevenskaja T.M. 285

Klob W. 228,301,381
Kluge S. 614
Kmitova K. 584
Kniep W. 81
Kobzar R.A. 130
Kolesov D.V. 120
Komisarov B.D. 161
Konětopský A. 331
Kononova S.D. 82,455
Koppe U. 169,520
Kosovinová D. 106
Kostinskaya I.I. 423
Kostova Z. 7,170
Kot W. 552,585
Kotalová D. 540
Kowda W. 669
Kozyreva A.V. 410
Kozucharov S. 424
König H. 356,478
Kreipke S. 83
Kramer B.R. 30
Kreiger K.G. 229
Krienitz D. 280
Krienitz L. 280
Kriech H. 411
Kropáčková A. 371
Kropotova I.I. 2[illegible]5
Krstěva M. 56
Kubička V. 6[illegible]
Kukushkin G.J. 84
Kummer C. 3
Kurok M.L. 72
Kusińska M. 418
Küppl R. 162
Kvasničková H. 85,586
Laan L.J. 286
Lange S. 230,345,456
Lapin V.I. 421
Lapworth C.O. 392
Lazarova M. 65
Längsfeld V. 526
Lees B. 587
Lefebvre D. 582
Leig E. 479,480,535
Leonard W.Qa. 42,376
Leps G. 562
Lerchner W. 392
Levina M.M. 49
Liebl V. 231
Liem U. 43
Lies 317,318
Lišková E. 150
Litsche G. 34
Ljubomirova 173
Lopez L.M. 279
Loś A. 428,429
Löther R. 111
Luczak J. 632,677
McLean N. 641
Maden R. 168
Mahn F. 368
Mahadeva M.N. 642
Mahmoud N.A. 300
Majecka Z. 287,521,542
Makarova T.V. 615
Margulis L. 616

Marenčík A. 232
Marty B. 54
Maschke J. 457
Matzke M. 35,129,522
Mauersberger G. 412
May J.C. 233
Mazo V.B. 377
Mc Allister M. 112
Mc Culloch J.H. 192
Mc Lachlan J.C. 382
Mc Lure J.W. 193
Mebst T. 86
Meisener K. 563
Mertens 528
Merrit S.V. 194
Meyer [illegible]. 195
Mikolajczyk W. 678
Milligan J.C. 51
Milne D.H. 56
Miluchcheva E. 132
Minina I.S. 274
Maygkova A.N. 11,12,530
Mladá J. 553
Mlodan B. 87,588,589
Morgensteing G. 430
Morinova B. 299
Moszner K. 113
Mottley J. 254
Muir H.J. 216
Musil J. 393
Müller D.G. 653
Müller F. 88
Müller G.J. 312
Nash P. 302
Nebel U. 371
Neumann G.H. 498,499
Niederland B. 10
Nielsen L.A. 89
Nismerko M. 554
Nikishov A.I. 163
Nikitenko E.I. 670
Nikofarova I. 359
Nowacki M. 370
Novák J. 419
Novotný I. 643,644
Novák T. 114
Nowak K. 155
Nozharova L. 458
Nowak L. 287,521
Oberhardt B., 459
Ochkur J.A. 44
Olczyk B. 291
Orlich D.C. 51
Ostas Z. 265
Ozlade E.L. 236
Padalko N.V. 14
Palka L. 50
Patterson D.I. 237
Pawelzig G. 57,304
Pearson F. 191
Pegarini M. 213
Pecka M. 90
Pechancová M. 333
Pfannstiel G. 500
Pfeil H. 91, 238
Pfirmann H. 43

499

Pfisterer J. 239
Philiber S.G. 122
Pietropaolo P. 281
Pimentel D. 599
Piotrowicz M. 45,555
Pitkin R.B. 383
Plat P. 590
Podstolska M. 564
Poenicke H.W. 240
Pohl H. 241
Pollak I. 255
Popov K. 12
Powell J.A. 383
Prantl J. 525
Przekop R. 482
Quackenbush R.E. 413
Quasigroch 414
Rabotnickiy R.K. 365
Radványi G. 341
Raynova T.Y. 394
Rashkova S. 58,275
Razbesov O.K. 385
Reaburn H. 196,197
Rebrova L.V. 63
Reinka Ch. 33
Reuter G. 242
Revina S.K. 92
Rice 166
Ricker K.S. 324
Ridpath I. 591
Riedel A. 198
Riedel W. 93
Richard P.W. 592
Richardson J. 367
Richardson M. 593
Roberts D. 55
Rohde Ch. 431
Romasheva A.T. 199
Rosická L. 415
Rowan A.N. 243
Rozenshteyn A.N. 334
Röll K. 303
Rumelhard G. 529
Rumyanceva A.N. 531
Rumyanceva M.N. 11,12,142,531
Runst H. 346
Rupprecht R. 43
Rushton B.S. 617
Russel J. 18
Sandner H. 623
Scadding S.R. 244
Sdobnov S.I. 594
Sehmrau W. 360
Sestini V.A. 276
Shamin A.N. 600
Sheffielde/Bastin J.H. 618
Shelton C.B.A. 245
Short K.C. 257
Showell J.P.M. 294
Schaefer H. 396
Schiefer H. 432
Schellhorn M. 544,598
Schlein A. 483
Schmid G. 305
Schmidt F. 115
Schmidt H. 634
Schmidt V. 216
Scholka H.G. 397

Schmude J. 247
Schneider H. 248,306
Scholz E.F. 596
Schreger C. 329
Schuler F. 501
Schulti H. 249
Schulz K. 250
Schulz-Kühnel Z. 95
Schrürer R. 545
Schwarz E. 251,502
Schwarz U. 66,288,461
Schwarzenbach A.M. 19,20, 200,252
Schwein W. 43
Síbrt F. 26
Siebert B. 505
Siegmund F. 556
Silberstein 266
Simmonds D. 361
Sládek E. 313
Slater P.J.B. 127
Slobodjan I.M. 282
Smail J.R. 597
Sokolowski A. 598
Solovova R.P. 423
Sorells N.R. 599
Spasov A. 164
Spray M. 55,337
Stackelbrandt 656
Staeck L. 21
Statkevič N.V. 462
Stead D.E. 253
Šlégl J. 117,384
Švarc J. 675
Tamir 266
Teplin C.E. 213
Tarwid R. 254,319
Tatum M.L.N. 122
Tsanev R. 566
Tsvethov R. 359,473
Terzijska I. 133
Theuerkauf H. 332
Thiel W.D. 497
Thiele K. 602
Thopsson T. 255
Thorpe P. 203,204,416
Tille R. 603
Timoshishin M.L. 67
Topf H. 151
Tranter J.A. 296
Treitz P. 97,398,635
Trommer G. 256
Tropleva K. 48
Tunniclife S.D. 123
Tvrdík J. 98
Ugrinova K. 164
Underhay V.H.S. 604
Velikov C.P. 59
Vitkova M. 134
Vlachov S. 605
Vodde J. 646
Voesack L. 557
Vogel G. 505,665
Vredeveld C. 657
Vredeveld R. 657
Waage 37
Wagner H. 673
Wagner K.G. 124

Walberg J.H. 30
Walicka R. 506
Wallon E.T. 366
Wandersee J.H. 205
Wa[illegible]le K. 257
[illegible]wska M. 606
[illegible] P.C. 206
Wear, [illegible] 191
Weber H. 465,619
Weigner H. 289
Welch W.W. 530
Wells R.V. 507
Wenske E. 277
Werner E. 620
Wessel V. 99,100
West R.W. 174
Whitney L.J. 541
Wild A. 608
Wilson E.O. 524
Winde P. 307
Windelband A. 491,507,511,
558
Winkel G. 290,484
Witkowski R. 666
Witt W. 485
Wójcik Z. 152
Wolf B. 249,258
Wolsh J. 330
Woolman C.H. 308
Wulke H. 433
Wunsch C. 508
Wiciechowski A. 474
Yager R.E. 22,539
Yakhyayeva M.I. 357
Yegorova T.G. 156
Yefstafiyev, J.V. 196
Younggreen N.A. 259
Yurhovshaya, V.Z. 638
Zabel E. 27,28,536,559,560
Zacharčenko G.G. 207
Zachipke C. 250
Zajkin J.V. 421
Zdebska-Sierosławska J. 320
Zębalska E. 8,9,353
Zipko S.J. 260,385
Zlatěva M. 126
Zöller W.W. 23
Zott R. 609
Zupanc G.K.H. 125,208
Zverev I.D. 25

Summary

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